INSTITUTE OF MICROELECTRONICS AND OPTOELECTRONICS

ANNUAL REPORT

2000

Edited by Agnieszka Mossakowska-Wyszyńska

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From the Director

The Institute of Microelectronics and Optoelectronics was founded in 1970. It evolved out of the Chair of Radio Engineering created by Professor Janusz Groszkowski in 1929. This Annual Report summarises the research activities of the Institute in 2000, as well as the teaching activities in the academic year 1999/2000.

These activities of the Institute in the field of electronics and computer engineering are focused on system implementations in microelectronics and optoelectronics. These two areas include VLSI systems, microelectronic and nanoelectronic semiconductor devices, hybrid circuits (e.g. microwave, optoelectronic), sensors, laser optoelectronics, electronic imaging and image processing.

We developed the domain mentioned above in spite of obstacles caused by external situation, mainly by economical conditions. Initiatives and creative efforts of the Institute's staff resulted in improvement of the research and teaching infrastructure and significant value of the research projects (local and international) carried out in the Institute, as well as in valuable publications and individual successes. Among these achievements: patents, best paper award, Prime Minister's prize and a conferment of two professor titles are mentioned further in this Report. It is worth emphasising, that the greatest investment in the history of our Institute was finished in 2000: complete modernisation of the laboratory of semiconductor technology – "clean room", together with the installation of the newest set-up for plasma processes.

In order to create better conditions for research and teaching activities, the Institute Development Found was established (three grants were conceded for the Institute's divisions for the first time) and changes in the Institute's structure were executed. Due to of the thematic and staff development two divisions arose from Division of Microelectronics, the names of two other divisions were updated and two new research and teaching groups were established.

I express my sincere appreciation to all colleagues for a big effort and for all attainments which determine the position of our Institute in the Faculty of Electronics and Information Technology. Thank you very much for friendly co-operation in creative and harmonious development of the Institute and for a compliance with high standards in all academic activities.

Warsaw, January 2001

Andrzej Pfitzner, Ph.D., D.Sc.

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1. GENERAL INFORMATION

1.1. Organisation of the Institute and Areas of its Activities

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

Our Institute consists of 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.

The main activity of the Institute is focused now on system implementations in both microelectronics and optoelectronics. During the past thirty years the Institute has built up its competence in:

- modelling of physical effects in modern semiconductor devices;
- monocrystalline and amorphous 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;
- the construction and characterisation of optoelectronics elements and devices including fiber sensors;
- 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 the grants form State Committee for Scientific Research and also by the European projects like Inco Copernicus, Vilab Copernicus, ICOP-DEMO, Maria Curie Skłodowska, and NATO for peace.

The results of our scientific activities were published in many paper submitted to prestigious international scientific journals and presented on national and mostly on international conferences in the form of communications as well as the invited lectures. Our involvement in these projects together with a growing number of personal contacts with foreign scientists lead us to formal agreements on international scientific co-operation (over 20) and participation in a number of international scientific joint projects (about 10).

1.2. Board of Directors

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1.3. Microelectronics and Nanoelectronics Devices Division

Head of the Division

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Senior academic staff

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Bogdan Majkusiak, Ph.D., D.Sc.,	Professor
Jan Szmidt, Ph.D., D.Sc.,	Professor
Tomasz Janik, Ph.D.,	Assistant Professor
Małgorzata Jurczak, PhD.,	Assistant Professor
Lidia Łukasiak, Ph.D.,	Assistant Professor
Zbigniew Pióro, Ph.D.,	Assistant Professor
Andrzej Rosiński, Ph.D.,	Assistant Professor
Jerzy Ruźyłło, Ph.D., D.Sc.,	Associate Professor
Aleksander Werbowy, Ph.D.,	Assistant Professor
Antoni Siennicki, Ph.D.,	Senior Lecturer
Jan Gibki, Ph.D.,	Lecturer
Józef Maciak, M.Sc.	Lecturer

Junior academic staff

Agnieszka Zarźba, M.Sc.,	Assistant
Sławomir Szostak, M.Sc.,	Assistant
Piotr Brzozowski, M.Sc.,	Ph.D. Student
Tomasz Dźbski, M.Sc.,	Ph.D. Student
Krzysztof Domański, M.Sc.,	Ph.D. Student
Kamil Kosiel, M.Sc.,	Ph.D. Student
Marek Kostana, M.Sc.,	Ph.D. Student
Maung Than Htun Aung, M.Sc.,	Ph.D. Student
Jakub Walczak, M.Sc.,	Ph.D. Student
Andrzej Wojtkiewicz, 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 MOS (metal-oxide-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).

1.4. VLSI Engineering and Design Automation Division

Head of the Division

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Senior academic staff

Tomasz Brożek, Ph.D.,	Assistant Professor
Zbigniew Jaworski, Ph.D.,,	Assistant Professor
Mariusz Niewczas, Ph.D.,	Assistant Professor
Elźbieta Piwowarska, Ph.D.,	Assistant Professor
Witold Pleskacz, Ph.D.,	Assistant Professor
Adam Wojtasik, Ph.D.,	Assistant Professor
Andrzej Pfitzner, Ph.D., D.Sc.,	Senior Lecturer

Junior academic staff

Mirosław Grygolec, M.Sc.,	Assistant
Robert Miklas, M.Sc.,	Assistant, Ph.D. Student
Andrzej Wielgus, M.Sc.,	Assistant
Grzegorz Janczyk, M.Sc.,	Ph.D. Student
Adam Jarosz, M.Sc.,	Ph.D. Student
Włodzimierz Jońca, M.Sc.,	Ph.D. Student
Adam Kowalczyk, M.Sc.,	Ph.D. Student
Jacek Laskowski, M.Sc.,	Ph.D. Student
Adam Lejman, M.Sc.,	Ph.D. Student
Dariusz Sarna, M.Sc.,	Ph.D. Student

Technical and administrative staff

Jerzy Gempel, M.Sc.
Stanisław Jeszka, M.Sc.
Marcin Sadowski, M.Sc.
Andrzej Wałkanis, 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 point 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: speech synthesis, data processing in physical experiments, etc.

1.5. Microwave Electronics and Photonics Division

Head of the Division

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Senior academic staff

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

Junior academic staff

Jarosław Dawidczyk, M.Sc.,	Assistant, Ph.D. Student
Zbigniew Pieńkowski, M.Sc.,	Assistant, Ph.D. Student
Zenon Szczepaniak, M.Sc.,	Ph.D. Student
Jerzy Szyper, 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

Head of the Division

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Senior academic staff

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Michał Borecki, Ph.D.,	Assistant Professor
Jerzy Kalenik, Ph.D.,	Assistant Professor
Ryszard Kisiel, Ph.D.,	Assistant Professor
Krystyna Lachowska, Ph.D.,	Assistant Professor
Stanisław Pietruszko, Ph.D.,	Assistant Professor
Lullita Pogorzelska, Ph.D.,	Assistant Professor
Zbigniew Szczepański, Ph.D.,	Assistant Professor
Maria Bebłowska, Ph.D.,	Senior Lecturer

Junior academic staff

Agata Jasik, M.Sc.,	Ph.D. Student

Technical and administrative staff

Ryszard Biaduń
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 gas sensors and pressure sensors;
- 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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Jerzy Kźsik, Ph.D., Assistant Professor
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Piotr Warda, M.Sc., Assistant Professor

Junior academic staff
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Wojciech Kamiński, M.Sc., Ph.D. Student
Tomasz Kossek, M.Sc., Ph.D. Student
Monika Kowalska, M.Sc., Ph.D. Student
Wojciech Kwaźniewski, M.Sc., Ph.D. Student
Robert Paszkiewicz, M.Sc., Ph.D. Student
Ryszard Piramidowicz, M.Sc., Ph.D. Student
Magdalena Szuflinska, M.Sc., Ph.D. Student
Konrad źwitalski, M.Sc., Ph.D. Student
Sylwia Tarasiuk, M.Sc., Ph.D. Student
Artur Wnuk, M.Sc., Ph.D. Student

Technical and administrative staff
Marek Markiewicz

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;
– theoretical research of laser generation in planar, fibre and hollow waveguide gas lasers, analysis of light generation in DFB (distributed feedback) 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
Hanna Górkiewicz-Galwas, Ph.D., Senior Lecturer

Junior academic staff
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Grzegorz Kukiełka, M.Sc., Assistant
Ryszard Pajźk, M.Sc., Assistant
Przemysław Baszak Ph.D. Student
Bartosz Dudziński, M.Sc., Ph.D. Student

Technical and administrative staff
Barbara Bałan, Ph. D. Med.
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 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.

1.9. Vacuum Science and Technology Group

Head of the Group
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Junior academic staff
Karol Szymański, M.Sc., Ph.D. Student

Technical and administrative staff
Piotr Karwański

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,
- development of CAD of vacuum systems.

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

1.10. Characterization of Electronic Materials Group

Head of the Group
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Janusz Rogowski, Ph.D., Senior Lecturer

Junior academic staff
Dariusz Grzźda, 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	1999	2000	DIFFERENCE
Academic staff	85	81	-4
Full professors	3	5	+2
Professors	6	6	0
Associate professors	3	0	-3
Assistant professors	27	28	+1
Senior lecturers	11	8	-3
Lecturers	1	2	+1
Assistants and Ph.D. students	34	32	-2
Technical staff	17	16	-1
Administrative staff	5	5	0
Space	3213,2	3254,9	+41,7
Teaching laboratories	1275,9	1275,9	0
Other laboratories	341,3	341,3	0
Offices of academic staff	1596	1637,7	+41,7
Computers	226	256	+30
Library resources	9534	9537	+3
Books (number of volumes)	9534	9537	+3
Journals (number of titles subscribed to)	0	0	0
Teaching activities	58	61	+3
Basic courses	47	51	+4
Advanced courses	8	8	0
Special courses	2	2	0
International projects	1	0	-1
Research projects	73	92	+19
Granted by the University	32	56	+24
Granted by State Institutions	26	22	-4
Granted by International Institutions	5	7	+2
Other projects	10	7	-3
Degrees awarded	48	87	+39
D.Sc. degrees	1	0	-1
Ph.D. degrees	3	3	0
M.Sc. degrees	25	45	+20
B.Sc. degrees	19	39	+20
Publications	158	182	+24
Sci.-tech. books	6	4	-2
Sci.-tech. papers in journals	73	24	-49
Sci.-tech. papers in conference proceedings	77	123	+46
Teaching aids	0	0	0
Other publications	2	31	+29
Reports	49	33	-16
Research reports	30	33	+3
Other reports	19	0	-19
Patents	1	2	+1
Conferences	172	143	-29
Organised by the Institute (number of conferences)	1	1	0
Organised by the Institute (number of participants)	75	19	-56
Others (number of conferences)	36	52	+16
Others (number of participants from the Institute)	60	71	+11

2. STAFF

2.1. Senior Academic Staff

Tadeusz Adamowicz, M.Sc. ('62), Ph.D. ('73), Quantum Electronics, Gas Discharges; Assistant Professor, full time, Optoelectronics Division, Member of IEEE (’97), Member of Plasma Physics Section at the Committee of Physics of the Polish Academy of Sciences (’94-)	room # 125 GR phone: 660-7778 e-mail: adamowicz@imio.pw.edu.pl
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Bogdan Galwas, M.Sc.('62), Ph.D. ('69), D.Sc. ('76), Microelectronics, Microwave Electronics, Full Professor, full time, Head of Microwave Electronics and Photonics Division (prev. Microwave Devices Division) (‘84-), Pro-Rector of Warsaw University of Technology (‘87-90), Director of Ph.D. Studies in Electronics and Telecommunications (‘92-), Member of Electronics and Telecommunications Committee of the Polish Academy of Sciences (‘88-), Chairman of the International Management Committee of the International Travelling Summer Schools (‘91-), Member of Scientific Council of Industrial Institute of Telecommunications (‘90-), Member of Scientific Council of Institute of Telecommunications (‘97-), Member of IEEE (‘94-), Member of IACEE (’97-), Member of SEFI (‘97-)	room # 51 GE phone: 660-7939, 825-03-93 fax: 825-03-93 e-mail: galwas@imio.pw.edu. b.galwas@elka.pw.edu.pl
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Hanna Górkiewicz-Galwas, M.Sc. ('60), Ph.D. ('69), Image Processing Techniques, Senior Lecturer, full time, Image Processing Division	room # 148 GE phone: 660-7780, 825-73-61 e-mail: gorkiewicz@imio.pw.edu.pl
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Andrzej źmiech	M.Sc.	Deputy-Director for Technical and Administrative Affairs	660-7777
Małgorzata Trzaskowska		Senior Technician	660-7534
Andrzej Wałkanis	M.Sc.	Senior Technician	660-7207

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**, Kazimierz Gniadek
[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] **Electronics 1** (Elektronika 1), **ELKA1**, Andrzej Jakubowski, Andrzej Pfitzner
[Edu9] **Electronics 3** (Elektronika 3), **ELKA3**, Wiesław Kuźmicz
[Edu10] **Fundamentals of Computer Science** (Podstawy technik komputerowych), **PTKO**, Michał Borecki
[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] **Fundamentals of Solid State Electronics 2**, (Elektronika Ciała Stałego 2), **ELCS2**, Zdzisław Mńczeński, Janusz Rogowski
[Edu14] **Hardware Implementation of Algorithms in VLSI Circuits** (Sprzńtowa implementacja algorytmów w układach VLSI), **SAV**, Elżbieta Piwowarska
[Edu15] **High Frequency Techniques** (Podstawy techniki w.cz.), **TWCZ**, Bogdan Galwas
[Edu16] **Hybrid Integrated Circuits Technology** (Technologia hybrydowych układów scalonych), **THUS**, Zbigniew Szczepański
[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 Kńsik
[Edu20] **Laser Engineering** (Technika laserów), **TL**, Faculty of Applied Physics and Mathematics WUT, Tadeusz Adamowicz
[Edu21] **Laser Physics** (Fizyka laserów), **FLA**, Paweł Szczepański
[Edu22] **Laser Physics** 2 (Fizyka laserów 2), **FL2**, Paweł Szczepański
[Edu23] **Logic Circuits** (Układy logiczne), **UKLO**, Institute of Control and Computation Engineering WUT, Adam Wojtasik
[Edu24] **Materials, Elements and Design of Electronic Equipment** (Materiały, elementy i konstrukcje), **MEiK**, Ryszard Kisiel
[Edu25] **Materials, Elements and Design of Electronic Equipment 2** (Materiały, elementy i konstrukcje2), **MEiK2**, Ryszard Kisiel
[Edu26] **Methods and Algorithms for Design Automation of VLSI circuits** (Metody i algorytmy automatyzacji projektowania struktur scalonych), **MAPS**, Adam Wojtasik
[Edu27] **Microelectronics Development Trends** (Kierunki rozwoju mikroelektroniki), **KRM**, Andrzej Jakubowski
[Edu28] **Microwave and Lightwave Integrated Circuits** (Mikrofalowe i optofalowe układy scalone), **MOUS**, Jerzy Piotrowski
[Edu29] **Models and Systems of Image Processing** (Modele i systemy przetwarzania obrazów), **MSPO**, Jerzy Wońnicki
[Edu30] **Noise Reduction in Electronics Systems** (Minimalizacja zakłóceń w aparaturze i systemach elektronicznych), **MZA**, Zdzisław Mńczeński
[Edu31] **Numerical Methods** (Metody numeryczne), **MNM**, Institute of Electronic Fundamentals WUT, Jerzy Krupka
[Edu32] **Object Programming in Java** (Praktyka programowania obiektowego w Javie, **PPOJ**., Adam Wojtasik
[Edu33] **Operating Systems 1** (Systemy operacyjne 1), **SOP1**, Andrzej Wielgus
[Edu34] **Optowave Telecommunication** (Telekomunikacja optofalowa), **TEOP**, Bogdan Galwas
[Edu35] **Photoelectric Phenomena in Semiconductors** (Zjawiska fotoelektryczne w półprzewodnikach), **ZFPP**, Stanisław Pietruszko
[Edu36] **Photonics' Fundamentals** (Podstawy fotoniki), **FOT**, Michał Malinowski
[Edu37] **Physical Fundamentals of Information Processing** (Fizyczne podstawy przetwarzania informacji), **FPPI**, Bogdan Majkusiak
[Edu38] **Physics of Solid State** (Fizyka ciała stałego), **FCSR**, Jan Szmidt
[Edu39] **Programming** (Programowanie), **PROG**, Adam Wojtasik, Marek Niewiński
[Edu40] **Programming 8051 microcontroler** (Programowanie mikrokontrolera), **PMIK**, Lidia Łukasiak
[Edu41] **Remote sensors** (Czujniki pól i parametrów ośrodków propagujńcych), **CPPO**, Mikołaj Baszun
[Edu42] **Quality and Productivity Management** (Zarzńdzanie produktywnońciń i jakońciń), **ZPJ**, Julita Pogorzelska
[Edu43] **Quality in Design and Manufacturing** (Jakońćw procesach projektowania i wytwarzania), **JPPW**, Zdzisław Mńczeński
[Edu44] **Semiconductor Devices** (Przyrzńdy półprzewodnikowe), **PPR**, Andrzej Jakubowski
[Edu45] **Semiconductor Devices for Optoelectronics** (Półprzewodnikowe elementy optoelektroniczne), **PEO**, Paweł Szczepański
[Edu46] **Silicon Thin Films** (Cienkie warstwy krzemowe), **CWK**, Stanisław Pietruszko
[Edu47] **Surface Mounting Technology** (Technologia montażu powierzchniowego), **TMP**, Ryszard Kisiel
[Edu48] **Technology of Integrated Circuits Fabrication** (Technologia monolitycznych układów scalonych), **TWMUS**, Romuald Beck
[Edu49] **Thick film sensors** (Grubowarstwowe czujniki pomiarowe), **GCZP**, Zbigniew Szczepański
[Edu50] **Thin Film Material Engineering** (Cienkowarstwowa inżynieria materiałowa), **CIM**, Jerzy Kruszewski

[Edu51] **VLSI Design in Stansard Cell Style** (Projektowanie układów scalonych VLSI w stylu komórek standardowych), **PUVS**, Zbigniew Jaworski

3.2. Advanced Courses

[Edu52] **Advanced Microelectronic and Optoelektronic Technologies** (Zaawansowane technologie mikroelektroniczne i optoelektronczne), **ZTMO**, Romuald Beck
[Edu53] **Advanced Physical Fundamentals of Optoelectronics** (Zaawansowane podstawy fizyczne optoelektroniki), **ZPFO**, Paweł Szczepański
[Edu54] **Design of VLSI Circuits** (Projektowanie struktur scalonych VLSI), **PSSV**, Wiesław Kuźmicz
[Edu55] **Digital Image Processing** (Cyfrowe przetwarzanie obrazów), **CPOO**, Jerzy Woźnicki
[Edu56] **Electronic and Photonic Devices for Telecommunication** (Przyrzźdy elektroniki i fotoniki dla telekomunikacji), **PEFT**, Bogdan Galwas
[Edu57] **Integrated Optoelectronic Circuits and Optical Logic Circuits** (Zintegrowane układy optoelektroniczne i optyczne układy logiczne), **ZOUL**, Michał Malinowski
[Edu58] **Physical Fundamentals of Nanoelectronics** (Podstawy fizyczne nanoelektroniki, **PFN**, Bogdan Majkusiak
[Edu59] **Semiconductor Structures for VLSI and ULSI Circuits** (Struktury półprzewodnikowe dla układów VLSI i ULSI), **SPVU**, Andrzej Jakubowski

3.3. Courses in English

[Edu60] **Electronics 1, EELE1,** Bogdan Majkusiak
[Edu61] **Physics 3, A,** Bogdan Majkusiak

4. RESEARCH PROJECTS

4.1. Projects Granted by the University

[Pro1] **The Development of Processing and Testing Methods of the Electronic Devices and Materials for Microelectronics and Optoelectronics** (Rozwój metod wytwarzania i badania materiałów i przyrządów w dziedzinie mikroelektroniki i optoelektroniki) project leader: Andrzej Pfitzner, May 1999 - May 2000, **sub-projects:**

[Pro1~~2~~.1] **Application of Monte-Carlo method in precision calculation of vacuum metrological systems properietes**, (Zastosowanie metody Monte-Carlo do precyzyjnych obliczeń w układach metrologicznych) sub-project leader: Piotr Szwemin, co-workers: Marek Niewiński~~, June 1998 - May 1999~~

The calculation's attempt of vacuum conductance of some typical components and metrological elements is made to achieve the precision on the level 10^{-5}.

[Pro1.2] **Development of Internet-based CAD tools** (Rozwój narzędzi wspomagania projektowania wykorzystujących internet), sub-project leader: Wiesław Kuźmicz

This work is the first step toward the Internet-based "virtual manufacturing". The problem of statistical design of IC cells, with special emphasis on analog IC design and device mismatch is addressed. A statistical CMOS process/device simulator accessible via user-friendly Web interface has been developed. The process is simulated in a statistical (Monte Carlo-type) loop with all kinds of variations, inter-die and intra-die, random and deterministic, taken into account. The input data includes device channel dimensions, orientations and positions on the chip. A statistical sample of chips is simulated. The outputs include SPICE model files with individual models for all simulated devices and a statistical file. A statistical postprocessor provides statistics of model parameters including correlations and mismatch. These data can be used for verification of manufacturability and optimization of IC designs. The user does not need to know the processing details and has no access to confidential manufacturing-related information.

[Pro1~~2~~.3] **Elaboration and Realization of Sub-assemblies for Radio-optical Link** (Opracowanie koncepcji i wykonanie elementów łącza radiowo-optycznego), sub-project leader: Bogdan Galwas

The work includes researches of short-distance three-channel optical-microwave link with subcarrier multiplexing for transmission digital and/or analog data between points of industrial measurement systems. The optical fiber link operates with Fabry-Perot laser diode at 1300 nm, multimode fiber and PIN photodiode receiver. From microwave point of view three carriers with frequencies 600 MHz, 800 MHz and 1 GHz were chosen.

[Pro1~~1~~.4] **Implementation of 5 new Random Number Generators into Moly Flow..er® software** (Implementacja 5 nowych generatorów liczb losowych do programu Moly Flow..er®), sub-project leader: Piotr Szwemin, co-workers: Marek Niewiński, ~~June 1998 - May 1999~~

To have a small uncertainty of computation in Monte -Carlo method, it is important to consider not only a very large number N of simulated molecules but also a good quality of a random number generator (RNG) characterised by suitable period length, good uniformity and low resolution. To ensure such a condition the new RNG based on algorithms published lately has been implemented. These RNG are :

1: based on an algorithm which is a combination of a Fibonacci sequence and an "arithmetic sequence" (using the subtraction).

2,3: two version of Multiple Recursive Generator

4: Tauworth Generator

5:Mersenne Twister Generator

[Pro1.5] **Investigation of thermally evaporated hollow-cathode He-Zn lasers** (Badanie lasera wnękowego He-Zn z ośrodkiem aktywnym wytwarzanym termicznie), sub-project leader: Tadeusz Adamowicz, co-workers: Krzysztof Dzięciołowski, Wojciech Kwaśniewski

Two short (10-cm active length) metal-ceramic tubes provided with cylindrical HC capable of withstanding the heating temperature up to 650C were constructed. Laser action on blue lines and several infrared lines was studied. Output power and small-signal gain as a function of discharge current, buffer gas pressure and temperature of the zinc reservoir was measured. Optimal operating conditions for each of laser lines were found.

[Pro1.6] **Lead-free solder and solder pastes for high temperature applications** (Luty i pasty bezołowiowe do pracy w podwyższonych temperaturach) sub-project leader: Ryszard Kisiel, co-workers: Jerzy Kalenik, Krystyna Lachowska, Zbigniew Szczepański, Ryszard Biaduń, Krystyna Szylko

The aim of the work was to investigate the electrical and mechanical properties of lead-free solder joints for high temperature applications.

Solder Sn95,5Ag4Cu0,5 was chosen for investigation in bulk as well as in paste form. For realise the goal of the work a prototype machine for measure the mechanical properties of joints onto PCBs was build. The force range 0 – 200 N with accuracy 0,1 N and displacement range 0 – 150 mm with resolution 0,1 mm was achieved for this machine.

The following technological parameters for lead-free solder paste were investigated: printability and wettability. It was found that mentioned above parameters are on acceptable level.

[Pro1.6] The mechanical and electrical properties of lead-free solder joints were investigated in room as well as in temperature 120°C before and after long time storage in temperature 120°C. After the storage the joints at high temperature the mechanical and electrical properties, measured in room temperature, were improved. The performance of SnAgCu joints at 120°C was also good, especially the shear and tensile strength for 1206 components onto PCB were better than for SnPb solder.

[Pro1.7] **Putting into operation and calibrating techological process realized in new cleanliness standards** (Uruchomienie i przeskalowanie procesów technologicznych realizowanych w nowym standardzie czystości), sub-project leader: Romuald B. Beck, co-workers: Andrzej Jakubowski, Jan Szmidt, Bogdan Majkusiak, Małgorzata Jurczak, Tomasz Janik, Aleksander Werbowy, Krzysztof Domański, Agnieszka Zarńba, Andrzej Wojtkiewicz, Witold Ciemiewski, Kazimierz Dalbiak, Małgorzata Trzaskowska

The main aim of this work was to achieve full processing abilities in the clean-room laboratory after its complete upgrading and rebuilding. The scopes would be twofold: technical, namely: rebuilding the infrastructures of vacuum, gas supply, compresed air, deionized water system and technological, namely: scaling the high temperature processes (oxidation dry and wet, and high temperature diffusion), optimization of photolitography processing (choice of photoresist, developer and exposure and developing time) and otheres.

[Pro1.8] **Texture Analysis System** (System analizy tekstur), sub-project leader: Hanna Górkiewicz-Galwas, co-workers: Jerzy Domański, Bartosz Dudziński, Grzegorz Kukiełka, Ryszard Pajńk

The aim of the work was to create computer system for analysis of the digital texture images and for assessment of discriminative and classificative features of the algorithms adequate for pattern recognition. Several algorithms have been implemented in Khoros – a digital signal-processing environment running under Linux operating system. Testing of the implemented algorithms was the main goal of the research project. The special digital image textures database has been created. The results of the testing procedures for textures taken from the database have been described.

[Pro2] **The Development of Designing, Processing and Testing Methods of the Electronic Devices and Materials for Microelectronics and Optoelectronics** (Rozwój metod projektowania oraz wytwarzania i badania materiałów i przyrzńdów w dziedzinie mikroelektroniki i optoelektroniki), project leader: Andrzej Pfitzner, May 2000 - May 2001, **sub-projects:**

[Pro2.1] **Double insulating layers systems based on thin and ultrathin SiO_2 (fabrication and characterization)** (Układy podwójnych warstw dielektrycznych oparte na cienkich i ultracienkich warstwach SiO2 (wytwarzanie i charakteryzacja)), sub-project leader: Romuald B. Beck, co-workers: Andrzej Jakubowski, Bogdan Majkusiak, Jan Szmidt, Tomasz Janik, Aleksander Werbowy, Lidia Łukasiak, Sławomir Szostak, Witold Ciemiewski, Kazimierz Dalbiak, Małgorztata Trzaskowska, Krzysztof Domański, Andrzej Wojtkiewicz

Recent developments in MOSFET gate dielectric layers technology prove that the double insulating layers systems seem to be the only reasonable solution for the next generations of the ICs. Formation of the top insulating layers on the ultrathin one creates many technical and technological problems to be overcome. Also characterization techniques have to be adapted for such a case and carefully tested before utilising them for investigations. The aim of this work was to practically challenge these problems on both, technological and characterization levels.

[Pro2.2] **The development of computer program for simulation analysis of vacuum primary standards parameters.** (Opacowanie programu komputerowego do analizy układów metrologicznych o symetrii osiowej), sub-project leader: Piotr Szwemin, co-worker: Marek Niewiński

The goal of this project is to develop the computer program which allows: a) compose vacuum primary standards model from predefined elements such as gas source; cylindrical, conical, spherical pipes, diaphragms b) calculate orifice conductance basing on time of flight method c) calculate the gas density and angular distribution in vacuum systems. Program is employing Monte-Carlo simulation and using different kinds of random number generators.

[Pro2.3] **Analysis and investigations of oscillation conditions in microwave oscillators with photovaractor** (Analiza i badania warunków generacji oscylatorów mikrofalowych sprzńżonych z fotowaraktorem), sub-project leader: Bogdan Galwas

The main topic of this project are the investigations of the new type of the optically controlled microwave devices - photovaractors. It covers both the measurements and the model extraction of the device. This model will allow to analyse the oscillation conditions and to design the optically controlled microwave oscilator.

[Pro2.4] **Elaboration and investigation of fibre optic nephelometer.** (Opracowanie i badanie nefelometru ńwiatłowodowego), sub-project leader: Jerzy Kruszewski, co-workers: Maria Bebłowska, Michał Borecki,

The aim of the work is the elaboration of a fibre optic nephelometer (a scattering turbidimeter) for the use in monitoring system of the relative water turbidity. The fabricated model is designated to installation in washing machines or dish-washers.

[Pro2.5] **Investigation of Flip Chip Joints Reliability** (Badania niezawodności połżczeż struktur z kontaktami podwyższonymi). sub-project leader: Zbigniew Szczepażski, co-workers: Ryszard Kisiel, Jerzy Kalenik, Krystyna Szylko, Ryszard Biaduż,

Over the past few years the most interest in packaging technology is focused on flip chip technology which enables highest interconnection density to obtain. In particularly this technology has recently been expanded on polymer substrates.

The main emphasis in these studies is focused on adhesive flip chip bonding on polymer substrate and underfilling process which increases long term joints reliability.

Reliability of flip chip joints depends of several parameters. Some of them like substrate properties, adhesive properties and underfill material are taken into account in these studies.

[Pro2.6] **Methodology and software developement for measuring systems of chosen properties of electronic materials** (Rozwój metodyki badaż i oprogramowania systemów pomiarowych do badaż wybranych właściwości materiałów elektronicznych), sub-project leader: Jerzy Krupka, co-workers: Zdzisław Mżczeżski, Janusz Rogowski, Mikołaj Baszun, Dariusz Grżżda, Jerzy Rudkowski

[Pro2.6] This work obeys:

Characterization of microwave ferrites at criogenic temperatures;

Characterization of a new stechiometric types of piezoceramics;

Characterization of soft magnetic materials nonlinearities for ultralow frequencies.

[Pro2.7] **Modeling and investigation of dielectric laser structure for visible wavelengths** (Modelowanie i badanie dielektrycznych 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 approach 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 praseodymium rare-earth doped laser materials. The significant interest in studying Ho^{3+}, Pr^{3+} and Tm^{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] **Digital image sequence segmentation for motion detection and analysis** (Segmentacja sekwencji obrazów cyfrowych na potrzeby detekcji i analizy ruchu) sub-project leader: H. Górkiewicz-Galwas

The aim of that project is elaboration of the universal method of segmentation, which makes possible detection and investigation the moving objects on the basis of singular digital image and digital image sequence. The applicated method concerning mathematical morphology gives bases to the analysis of structural features of objects. This method of segmentation is the closest to rules of functioning of the human perception system HVS.

[Pro2.9] **Degradation Analysis of phenomena in ceramics with negative temperature coefficient of resistance** (Analiza zjawisk degradacyjnych w ceramice termistorowej z ujemnym temperaturowym współczynnikiem oporności), sub-project leader: Julitta Pogorzelska

Work is devoted to defining of main causes deciding about degradation mechanisms in ceramics with spinel structure obtained from oxides of transient metals.

[Pro2.10] **Laboratory complex „Semiconductor Devices”** (Zespół laboratoriów „Przyrzżdy Półprzewodnikowe”), sub-project leader: Jan Szmidt, co-workers: Romuald B. Beck, Krzysztof Bracławski, Jan Gibki, Tomasz Janik, Małgorzata Jurczak, Andrzej Rosiżski, Antoni Siennicki, Aleksander Werbowy, Agnieszka Zarżba, Józef Maciak

The goal of the project is introduction of general changes to old variant of students' measurement laboratory and compilation of its new version. There will be prepared 10 new and modern laboratory exercises with new instruction manuals.

[Pro2.11] **Microelectronic SAW sensors** (Mikroelektroniczne czujniki z akustycznż falż powierzchniowż), sub-project leader: Mikołaj Baszun, co-workers: Dariusz Grżżda, Jerzy Rudkowski

This work obeys:

Working out the methods and computer program for design of sensors with dominatinf one of the three usefull wave modes: Rayleigh mode, shear horizontal mode and/or acoustic plate mode;

Working out the methods and computer program for analysis of transmittance of SAW delay lines with arbitrary geometry of interdigital transducers.

These researches are planned to be continued in the next years, ending by production of some kinds of chemosensors.

[Pro3] **Analysis of tree structures in medical images** (Analiza struktur drzewiastych w obrazach medycznych), project leader: Hanna Górkiewicz-Galwas, co-workers: Jerzy Domażski, May 1999 – May 2000

This research project concerns the analysis of digital medical images of the tissue with the net of blood vessels caused by disease process. The special feature of the blood vascularity is its tree structure. The main objective of the project has been the development of the detection process by means of the texture analysis. The new algorithms of the analysis based on the Local Principal Component Analysis enhanced of Rough Set methodology have been elaborated.

[Pro4] **Assembly Process for Silicon Structures with Gold and Solder Bumps** (Opracowanie technologii dołżczania struktur półprzewodnikowych z kontaktami podwyższonymi) project leader: Zbigniew Szczepażski, July 1999 - May 2000

Flip chip technology has recently gained increasing importance and its application is expected to increase significantly in the next years.

In particular flip chip technology is expanded for Laminates substrates due tu such application as MCM-L, CSP, BGA.

In our studies to make easier flip chip structures fabrication, instead of silicon structures, ceramic and glass structures with gold bumps were designed and fabricated. Such structures were bonded to organic substrate using adhesives and solder pastes. The connected resistance of the bonded bumps before and after thermal test was measured.

[Pro5] **CMOS implementation of electronic circuits for spread spectrum communication based on chaos generators**, (Implementacja ukladow do lacznosci szerokopasmowej wykorzystujacych generatory drgan chaotycznych w technologii CMOS), project leader: Witold Pleskacz, co-worker: Miroslaw Grygolec, July 1999 - May 2000

The project deals with the new idea of more robust and secure communication by using chaotic generators. The main goals of this work are: a) theoretical analysis of chaos generators and the design of circuits that satisfy the conditions for chaos generation and communication; b) full custom CMOS design and fabrication of considered electronic system.

[Pro6] **Microscopic image analysis and recognition system** (System analizy i rozpoznawania cyfrowych obrazów mikroskopowych), project leader: Jerzy Woźnicki, co-workers: Grzegorz Kukiełka, Bartosz Dudziński, Ryszard Pajńk, May 1999 – May 2000

The purpose of the project is to develop a universal image analysis and recognition system of microscopic images. To evaluate the results of the various experiments, the project requires quantitative analysis of large amounts of microscopic pictures. This makes automatic or almost automatic image analysis methods necessary. This range from basic segmentation methods, various colors within the sample are determined. There are several features used that can characterize structures in biological samples like size distribution, and spatial distributions of various spots to developing both measures and measuring

[Pro6] methods. The novelty of this project is that sample preparation methods will be developed in close co-operation with image analysis methods, to get stable and objective results. The digital image analysis involves segmentation and extraction of objective distribution measures of objects. The system is used for digital computer analysis of tumour-induced angiogenesis on an animal model.

[Pro7] **Modeling of static characteristics and parameters of SiGe devices (**Modelowanie charakterystyk i parametrów przyrzńdów półprzewodnikowych z krzemogermanu), project leader: Andrzej Jakubowski, co-workers: Bogdan Majkusiak, Tomasz Janik, Lidia Łukasiak, Andrzej Wojtkiewicz, Krzysztof Bracławski, June 1999 - May 2000

The goal of this research project was to model static characteristics of SiGe devices, mainly heterojunction bipolar transistors (HBT) and MOS transistors. The developed models enabled the influence of several parameters on the device characteristics to be analyzed. The investigated parameters included e.g.distribution of Ge in the base of a HBT, base doping, SiGe gate (its influence on MOSFET threshold voltage).

[Pro8] **The fibre optics' turbidimetr preparation and examination (**Opracowanie i badanie turbidimetru ńwiatłowodowego**)**, project leader Jerzy Kruszewski, co-workers: Maria Bebowska, Michał Borecki, June 1999 - May 2000

The turbidimeter is a device for measuring turbidity of liquid medium that arises from suspension that causes absorption and dissipation of light. There are transmission, dissipation and ratio turbidimeters. The aim of the work was fibre optic turbidimeter version preparation.

[Pro9] **The elaboration of new method for light propagation analysis in fibre optic bending** (Opracowanie nowej metody analizy wpływu zakrzywienia włókna na propagacjń ńwiatła), project leader: Michał Borecki, co-workers: Jerzy Kruszewski, Maria Bebłowska, Marcin Wysocki, June 1999 - May 2000

Power dissipation and mode dispersion are disadvantages' phenomenon naturally occurring in optical fibres. Their intensities grow in fibre bending. There are few methods for power dissipation estimation, but because of assumed simplifications they apply for single mode fibres and ring-shaped bending. The aim of the work was elaboration and analysis of computer method for light transmission analysis in multimode fibre bending described by Bezire curve.

[Pro10] **An automatic sensor with increased resolution for liquid medium distinction** (Automatyczny czujnik rozrńniajńcy ońrodki ciekłe o zwińkszonej rozdzielczońci), project leader Jerzy Kruszewski, co-workers: Maria Beblowska, Michał Borecki, June 1999 - May 2000

The basic sensor task is distinction of liquid medium type with resolution of its modifications. Pollutants and medium tearing (for example eatable oil in frying pan could cause this modification). These factors modified the viscosity and index of refraction. The aim of the work was review and elaboration of computer system for detection of liquid medium type with resolution of its modifications by simultaneous analysis of medium viscosity and index of refraction.

[Pro11] **Optical and laser properties of highly rare earth doped Re^{3+}:YAG/YAG planar waveguides (**Badanie włańciwońci optycznych i generacyjnych silnie domieszkowanych warstw ńwiatłowodowych RE^{3+}:YAG/YAG), project leader: Michał Malinowski, co-workers, Paweł Szczepański, Marcin Kaczkan, Ryszard Piramidowicz, Artur Wnuk, 1999 - 2000

Planar optical devices play an increasingly important role as the components for fiberoptic communication systems. One of the recent important developments is the successful operation of IR planar waveguide amplifiers and lasers, which could be easily coupled to fiber components. Compact waveguide lasers that operate in the blue region of the visible spectrum offer broad range of special and commercial opto-electronic applications, such as complex data transmission and interpretation, full-colour displays and colour printing.

In this project optical and laser properties of highly doped epitaxial YAG waveguides on YAG substrates are investigated.

[Pro12] **Technological conditions of plasma synthesis of silicon carbide (SiC) films on silicon (Si)** (Warunki technologiczne wytwarzania warstw wńglika krzemu (SiC) metodami plazmowymi na powierzchni krzemu (Si)), project leader: Jan Szmidt, co-workers: Małgorzata Jurczak, Aleksander Werbowy, Witold Ciemiewski, Kazimierz Dalbiak, Małgorzata Trzaskowska. June 1999 - May 2000.

The goal of this work is determination of technological conditions of plasma synthesis of silicon carbide films as well as their successful deposition on silicon and silicon carbide substrates.

There are investigated structural, electrophysical and mechanical properties of obtained material. There are also made attempts of fabrication and characterization of simple electronic structures (e.g. MIS) with synthesized SiC layers.

[Pro13] **The influence of MOS/SOI transistor channel dimensions on carriers mobility** (Wpływ rozmiarów kanału tranzystora polowego MOS/SOI na ruchliwość nośników), project leader: Bogdan Majkusiak, co-workers: Jakub Walczak, Tomasz Janik, June 1999 - May 2000

The aim of the work is developoment of a computer model and program for calculation of carriers mobility in the MOS/SOI transistor channel considering quantization of energy effects. It was necessary to develope two versions of the program – the first one for MOS trnasistor and the second one for double-gated SOI transistor to isolate quantization of energy effects in the surface inversion layer and quantization of energy due to very low thickness of the semiconductor layer.

The calculations using the programs allowed to carry out theoretical analysis of semiconductor layer thickness of MOS/SOI transistor influence on the effective mobility in the channel, staring from theoretically infinite thickness (conventional MOS transistor) up to several nanometer range (MOS/SOI transistor) and to come to practicall conclusions as far as designing of MOS/SOI circuits is concerned.

[Pro14] **Ultrathin silicon dioxide (SiO_2) and high – K dielectrics layers (manufacturing and chracterization)** (Uktracienkie warstwy dwutlenku krzemu (SiO_2) i dielektryków o wysokiej stałej dielektrycznej (wytwarzanie i charakteryzacja)), project leader: Romuald B. Beck, co-workers: Krzysztof Domaąski, Marek Gutkowski, Andrzej Jakubowski, Tomasz Janik, Lidia Łukasiak, Bogdan Majkusiak, Jan Szmidt, Aleksander Werbowy, Sławomir Szostak, Witold Ciemiewski, Kazimierz Dalbiak, Małgorzata Trzaskowska. June 1999 - May 2000

[Pro14] The main aim of this work was to scale the dry oxidation down to the range of ultrathin oxide layers thickness. The pressure was put to obtain the high quality layers, thus, all the efforts have been made to stay in the high oxidation temperature regime (about 1000°C). The obtained layers properties were examined by electrical characterization methods using MOS capacitor / diode and MOSFET as test tool. First attempts of testing PECVD method, from the process controlability point of view as an alternative method of oxide but also nitride layers formatyion were also made.

[Pro15] **The Development of Teleinformatics and Multimedia Methods and Tools for Education of Engineers** (Rozwój metod i narządzi teleinformatycznych i multimedialnych w kształceniu inąynierów), project leader: Bogdan Galwas, January 2000 – December 2000

The main topic of this project is the preparation of the teaching materials for a few subjects e.g., mathematics, physics, circuits theory etc., as an internet off-line site on CDROMs. These materials will be used in extra-mural studies and later in the internet studies, so called ”SPRINT”.

Additionally, an internet site ”New Technologies in Education” is being prepared.

[Pro16] **Novel technologies and constructions in microsystems** (Nowe technologie i konstrukcje w zakresie mikrosystemów), project leader: Romuald B. Beck, co-workers: Andrzej Jakubowski, Bogdan Majkusiak, Jan Szmidt, Tomasz Janik, Aleksander Werbowy, Lidia Łukasiak, Sławomir Szostak, Witold Ciemiewski, Kazimierz Dalbiak, Małgorztata Trzaskowska, Krzysztof Domaąski, Andrzej Wojtkiewicz. March 2000 - December 2000

The aim of this work is to check on the experimental level the technical abilities of deep silicon etching by silicon technology compatibile wet etching and plasma etching in fluorine containing RIE. The studied new technoloques have been available only since major upgrade of the technological laboratory in IMiO PW.

[Pro17] **Simulation methods in designing and analysis of high vacuum systems.** (Metody symulacyjne w projektowaniu i analizie układów wysokiej i bardzo wysokiej próąni), project leader: Piotr Szwemin, June 2000-May 2001

[Pro18] **Microelectronic structures with plasma deposited diamond films** (Mikroelektroniczne struktury z udziałem warstw diamentowych wytwarzanych w procesach plazmochemicznych), project leader: Jan Szmidt, co-workers: Aleksander Werbowy, Tomasz Guzdek, D. Kukla, Maung Than Htun Aung, June 2000 - May 2001

The aim of the study is determination of technological process parameters allowing fabrication of MIS capacitors and transistors with nanocrystalline diamond (NCD) and diamond-like carbon (DLC) films. Plasma etching of films will be investigated as well as electrophysical parameters of produced structures.

[Pro19] **Aluminum nitride (AlN) passivation and protective layers for silicon carbide-based (SiC) Schottky diodes** (Pasywujące i zabezpieczające warstwy azotku glinu (AlN) dla diod Schottky’ego na wągliku krzemu (SiC)), project leader: Aleksander Werbowy, co-workers: Andrzej Jakubowski, Andrzej Olszyna, Jan Szmidt, Agnieszka Zarąba, Maung Than Htun Aung, Hubert Matysiak, June 2000 - May 2001

The goal of the project is evaluation of plasma deposited nanocrystalline AlN films as passivation and protective layers for SiC Schottky diodes. For this purpose I-V characteristics of SiC Schottky diodes with Ni contacts will be studied prior and after their passivation with AlN layers.

[Pro20] **Investigation of the influence of phosphorous doping and hydrogen content on stability of amorphous silicon**(Badanie wpływu domieszkowania fosforem i zawartości wodoru na stabilność krzemu amorficznego), project leader: Stanisław Pietruszko, co-workers: Michał Urbaąski , Marek Kostana, Rafał Szczą́śniak, June 2000 – May 2001

The influence of phosphorous doping (range of 10^{15} - 10^{21} cm^{-3}) done by ion implantation on stability of amorphous silicon is investigated. Additionally a-Si films are hydrogenated by ion implantation to achieve hydrogen content of 5 at.%. This project is directed at understanding the basic phenomena that limit the performance and reliability of thin-film amorphous solar cells.

[Pro21] **The light propagation method elaboration with include skew rays for bend optical fibres** (Opracowanie metody analizy propagacji światła z uwzględnieniem promieni skrośnych w zakrzywionych włóknach optycznych), project leader: Michał Borecki, co-workers: Jerzy Kruszewski, Maria Bebłowska, June 2000 – May 2001

The method of large core multimode optic fibre bend influence on its power transmission capabilities, based on NRT technique is elaborate. The novelty of this method is the use of Bezier's curve for description of the bend and introduction of skew rays into analysis. To determine the transmission parameters the Monte Carlo scheme was used. The results obtained by the authors indicate that the precision of the obtained results is influenced by two factors: the number of analysed rays according to Monte Carlo scheme, and the precision of bend description. When the convergence conditions are met, it shows that this method gives results in accordance with those obtained in experiments with multimode optic fibres.

[Pro22] **Ion argon laser discharge tube technology** (Opracowanie technologii wykonania kapilary wyładowczej jonowego lasera argonowego), project leader: Jerzy Kżsik, co-worker: Piotr Warda, June 2000 – May 2001

The purpose of the project is execution of initial technology of silicon carbid laser discharge tube. The first problem is elaboration of SiC metalization to obtain the hard brazed SiC-Cu joints with a good quality and high thermal shock resistance. The another is solution of problem of TiC i B_4C evaporation on SiC substrate to increase the ion sputtering resistance. The project results will make possible to construct the argon laser discharge tube with better output parameters in comparison of well known solutions.

[Pro23] **Modeling and investigation of neodymium doped fiber laser** (Analiza pracy i badanie neodymowych laserów światłowodowych), project leader: Michał Malinowski, June 2000 – May 2001

It was recently proved that lightwave circuits based on silica fibers offer an attractive and low-cost technology for both passive and active devices. One of the recent important developments is the successful operation of fiber amplifiers and lasers, which could be easily coupled to fiber components. In this work we present a general modeling of Nd-doped fiber laser. Approximate analytical results are derived for the threshold and the output intensities. Reasonable agreement between the experimental and model results are achieved for diode pumped Nd- doped silica fiber.

[Pro24] **Real time analysis of blood-vessel structures in medical images** (Analiza struktur naczyniowych w obrazach medycznych w czasie rzeczywistym), project leader: H. Górkiewicz-Galwas, June 2000 – May 2001

The main task of this work is development of earlier elaborated algorithms, which support the analysis of blood-vessel structures in medical images. To make the detection of new blood-vessel structures in real time possible, there were some attempts to use new multimedia VLIW architecture processor for image segmentation and texture analysis.

[Pro25] **Physical phenomena and devices of nanoelectronics** (Zjawiska fizyczne i przyrzżdy nanoelektroniki) project leader: Bogdan Majkusiak, co-workers: J. Walczak, K. Kosiel, June 2000 – May 2001

The goal is a theoretical consideration and development of computer models of nanelectronic devices such as quantum point contact single-electron transistor, single-electron turnstile, as well experimental and theoretical investigation of MOS tunnel devices.

[Pro26] **Modelling and verification of primary standards for high and ultra high vacuum** (Modelowanie i weryfikacja układów metrologicznych generujżcych niskie i bardzo niskie ciśnienia gazu) project leader: Piotr Szwemin, co-worker: Marek Niewiżski, June 2000 – May 2001

The main aim is to verify the parameters of vacuum primary standards with use of Monte-Carlo simulation. The calculation of real systems will be performed. The optimisation of blocking plate location will be undertaken. The conductance correction factor will be determined taking into account the gas density distribution.

[Pro27] **An arrangement for investigation of optoelectronic devices** (Stanowisko do badaż układów optoelektronicznych), project leader: Jerzy Kruszewski, co-workers: Maria Bebłowska, Michał Borecki, June 2000 – May 2001

The laboratory set is destinated for examination of optoelectronic devices in the range of 1.55μm. The arrangement is eguiped with two laser diode source (λ_1 = 1.55μm. and λ_2 = 0.98μm), that gives the possibility to investigate active fibres as well as fibre optic amplifiers system.

[Pro28] **Directivity analysis for piezoelectric ultrasonic transducers** (Analiza charakterystyk kierunkowych promieniowania piezoelektrycznych przetworników ultradżwiżkowych), project leader: Jerzy Krupka, co-workers: Mikołaj Baszun, Dariusz Grżżda, Jerzy Rudkowski, June 2000 – May 2001

This work obeys:

Precising of mathematical models for vibration analysis for transducers of an arbitrary shapes;

FEM analysis of surface vibrations;

Design of transducer shapes to obtain the best convergence of ultrasonic energy at the given remote object localization.

[Pro29] **Investigation of degradation mechanism in thermistor ceramics with negative temperature coefficient (**Badanie mechanizmu degradacji ceramiki termistorowej z ujemnym temperaturowym współczynnikiem oporności), project leader: Julitta Pogorzelska, co-worker: Józef Maciak, June 2000 – May 2001

The aim is to define mechanism of ceramics degradation processes, which are necessary to build fuzzy logic model.

[Pro30] **Investigations of UV generation in a Ne-CuBr ion laser using a positive column discharge** (Badania warunków generacji w obszarze ultrafioletu w laserze jonowym Ne-CuBr wykorzystujżcym kolumnż dodatniż wyładowania), project leader:Tadeusz M.Adamowicz, June 2000 – May 2001

Oscillation conditions on several UV 248 - 270 nm laser lines in neon - copper bromide mixtures are to be investigated in positive column (PC) discharges created in a long silica and ceramic tubes with a special copper diaphragms. Small-signal gain and output power are measured as functions of CuBr source temperature, intensity, duration and repetition rate of discharge current pulses.

[Pro31] **Solid state lasers with μm-size confined structures** (Badanie i modelowanie dielektrycznych mikrostruktur laserowych), project leader: Paweł Szczepański, June 2000 – May 2001

Microdisk and spherical waveguides, resonators, and lasers are important optoelectronic devices because of the possibility of their implementation as compact and efficient passive or active devices, based on their high Q circular structure. Particularly microdisk lasers have low threshold and the low-order transverse-electric mode is dominant Experimental results revealed a possibility of a narrow-band single-mode lasing and a high spontaneous emission coupling strength.

In the program we perform a systematic study of the nonlinear operation of microdisk lasers. On the basis of the energy conservation theorem we derive an approximate formula which relates the small signal gain in the active medium to the output power and real parameters of the laser structure. In particular, the laser characteristics obtained for whispering-gallery modes and radial modes reveal the behavior of the optimal outcoupling coefficient (which provides maximal power efficiency) as a function of the structure parameters.

[Pro32] **Praseodymium doped fiber waveguide visible laser** (Model użytkowy widzialnego lasera włóknowego aktywowanego jonami Pr^{3+}+Yb^{3+} pompowanego diodź laserowź), project leader: Michał Malinowski, July 2000 – June 2001

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 modeling of energy transfer processes in Pr/Yb double doped fiber lasers are performed.

[Pro33] **The functional model of intelligent liquid recognition sensor** (Model użytkowy inteligentnego czujnika rozpoznawania cieczy), project leader: Jerzy Kruszewski, co-workers: Maria Bebłowska, Michał Borecki, July 2000 – June 2001

The work refers to the construction and working principles of intelligent sensor used for distinguishing water alcohol oil and oil modified samples. The sensor consists of intensity fibre head mounted on lift and computer measurement device with a detection block. The head works on the Fresnel reflection intensity basis and consists of the ending of large core polymer optical fibre. The optical signal from the head is converted in optoelectronics interface and feeding into detection block.

[Pro33] The detection is based on the processed data feed on multilayer perceptron neural network. The sensor inelegance is effect of simultaneous indirect examination of different physical phenomenons. They occur during the head submerging, submersion, emerging and emergence in the detected medium.

[Pro34] **Texture classification using local principle components analysis** (Klasyfikacja tekstur przy użyciu lokalnej analizy składowych głównych), project leader: Jerzy Woźnicki, July 2000 – June 2001

Texture classification methods are used in many applications i.e. medical image analysis, multimedia data base searching, digital image segmentation and shape analysis. The LPCA classification is based on local subspaces. When the distance between measure vector and any of the local subspaces is minimum the LPCA algorithm marks out that subspace. The goal of this work is to compare properties of LPCA method with existing methods of texture analysis.

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

[Pro35] **Fibre optics amplifier's elaboration for 1.06mm laser range meter and for 1.53mm pumped by laser diodes PBZ-32-10, Task 4,** (Opracowanie wzmacniaczy włóknowych na zakres 1.06mm dla dalmierza laserowego i na 1.53mm pobudzanych diodami laserowymi), Warsaw University of Technology, Institute of Microelectronics and Optoelectronics, project leader Jerzy Kruszewski, co-workers: Maria Bebłowska, Michał Borecki, April 1997 - June 2000

Nowadays optical fibre amplifiers are widely used. Basic amplifier parameter is gain. There are many theoretical problems when the amplifier is constructed. There are many publications that present the single mode erbium doped fibre amplifiers pumped co-directionally, and there is very little information available about multimode amplifiers, and about amplifiers pumped in other way example: contra-directionally. Singlemode amplifier gain identification is known. The aims of this work were construction of multimode fibre amplifier model then analysis of amplification and noise effects. On this basis the laboratory amplifier model should be constructed.

[Pro36] **Application Of A Coaxial Line - Waveguide Below Cut-Off Transition For Microwave Methods Of Dielectric Measurements** (Zastosowanie połżczenia linia współosiowa - podkrytyczny falowod kołowy w mikrofalowych metodach pomiaru dielektryków), Warsaw University of Technology, Institute of Microelectronics and Optoelectronics, project leader Jerzy K. Piotrowski , Bogdan Galwas, Jerzy Skulski, Zenon Grzymała, Barbara Szymulska, August.1998 – January 2000

The coaxial line - circular waveguide transition is studied for use in wideband as well as resonator methods of dielectric measurements. The goal of the project is elaboration of theoretical basis as well as numerical and empirical tools for the above methods.

[Pro37] **Vacuum Controller for the pressure range 10^{5}-10^{-10} Pa** (Opracowanie próżniomierza jonizacyjnego na zakres 10^{-10} - 100000 Pa z mikroprocesorowym układem kontrolnym), Warsaw University of Technology, Institute of Microelectronics and Optoelectronics, project leader: Piotr Szwemin, June 1998 – October 2000

Three gauges: convection, Pirani and nude modulated Bayard Alpert all in UHV technology will be constructed as a pressure transducer within the project as well as programmable electronic supply and measuring unit.

[Pro38] **Charge pumping in SOI structures: modeling and parameter extraction** (Metoda pompowania ladunku w strukturach SOI: model i ekstrakcja parametrow), Warsaw University of Technology, Institute of Microelectronics and Optoelectronics, project leader: Andrzej Jakubowski, co-worker: Sławomir Szostak, September 1999 - October 2000

The aim of this research project is to built a system for charge pumping analysis of SOI and bulk MOSFETs. Characterization is based on original mathematical description of charge pumping. Genetic algorithms are used to fit theoretical curves to experimental data.

[Pro39] **The influence of polymer matrix and filer type on adhesive joints performances** (Badanie wpływu wybranych układów polimerów wiążących i napełniaczy na parametry użytkowe połącześ wykonywanych klejami elektrycznie przewodzącymi), Warsaw University of Technology, Institute of Microelectronics and Optoelectronics, project leader: Ryszard Kisiel, co-workers: Jan Felba, Krystyna Bukat, Kazimierz Friedel, Andrzej Mościcki, Zofia Morawska, Zbigniew Szczepaśski, Tadeusz Sobierajski, July 1999 – December 2000

The aim of the project is the investigation of polymer matrix type and filler type on mechanical and electrical parameters of adhesive joints onto PCBs. Such compositions can be used as solder replacement in PCB assembly. Test samples were selected and elaborated for measure the mechanical and electrical parameters of adhesive joints onto PCBs. The blend of silver flakes and semiflakes was selected as the best filler type.

[Pro40] **Modelling And Characterization Of Quantum Effects In MOS SOI Devices** (Modelowanie i charakterystyka efektów kwantowych w przyrządach typu MOS SOI), Warsaw University of Technology, Institute of Microelectronics and Optoelectronics, project leader: Bogdan Majkusiak, co-workers: Tomasz Janik, Andrzej Jakubowski, Jan Szmidt, Romuald B. Beck, Lidia Łukasiak, Agnieszka Zareba, Jakub Walczak, Kamil Kosiel, Antoni Siennicki, Józef Maciak, October 1998 - September 2001

The purpose of the project is consideration of consequences of energy quantization and tunnelling effect on electrical characteristics of the metal-oxide-semiconductor devices fabricated in the silicon-on-insulator (SOI) technology. The detailed tasks are: developing a theoretical model of the MOS SOI tunnel diode, consideration of influence of semiconductor body thickness o tunnel current in MOS SOI tunnel diode and the gate and drain currents in MOS SOI transistor, investigation of the effect of energy quatization on operation of an MOS SOI transistor, investigation of resonance tunnelling in MISIM transistor.

[Pro41] **Digital image analysis and processing of neovascularization** (Analiza procesów neowaskularyzacji metodami cyfrowego przetwarzania obrazów), Warsaw University of Technology, Institute of Microelectronics and Optoelectronics, project leader: Jerzy Wośnicki, co-workers: Grzegorz Kukiełka, Hanna Górkiewicz-Galwas, Jerzy Domaśski, Bartosz Dudziśski, Ryszard Pająk, April 1999 – March 2002

[Pro41] Angiogenesis is the formation of new blood vessels, which occurs in normal physiological conditions. It is also an underlying process in the pathogenesis and invasion of neoplasms. New blood vessels develop from pre-existing blood vessels. Different substances may have an influence on the process. The process of angiogenesis is subject to the effects exerted by pro- and anti-angiogenic factors released by various cells and tissues which, in normal physiological conditions, are maintained in balance. However, a loss of the balance leads to generation or inhibition of neovascularisation.

The main goal of the project is to assess the effects of various substances on the development of new blood vessels using digital image processing system in co-operation with surgical microscope and Sidky and Averbach criteria (1975). The digital image processing methods introduce automatic quantification of surface, shape and size of new blood vessels.

The most significant information portrayed visually in the microscopic images refers to physical changes reflecting processes in the new blood vessels as well as their geometry. Hence the first stage is to detect the contours of the objects studied. The method of detecting the contours of new blood vessels is an advanced type of filtration, which may be described as a recursive differential filter (RDF). The method used in the digital computer image processing in order to remove the information about 'large' blood vessels will allow automated quantification of new blood vessels formed in the due course of angiogenesis.

[Pro42] **Integration of the micromechanics systems technology with CMOS technology based on the atomic force microscopy devices principles** (Integracja technologii wytwarzania systemów mikromechanicznych z technologią CMOS na przykładzie sond dla mikroskopii sił atomowych), Warsaw University of Technology, Institute of Microelectronics and Optoelectronics, project leader: Andrzej Jakubowski, co-worker: Tomasz Dśbski, September 1999 - October 2000

Mean goal was development of the test devices based on the integration of the micromechanics technology and CMOS technology. Atomic force microscopy devices were manufactured and characterised. By using AFM devices tribological properties of the surface were characterised.

[Pro43] **Investigations and modelling of the influence of parasitic phemomena on the operation of the VLSI circuits, taking into account manufacturing conditions** (Badanie i modelowanie wpływu zjawisk pasożytniczych na pracś układów scalonych VLSI z uwzglśdnieniem uwarunkowaś technologicznych), Warsaw University of Technology, Institute of Microelectronics and Optoelectronics, project leader: Andrzej Pfitzner, co-workers: Elżbieta Piwowarska, Witold Pleskacz, Jacek Laskowski, Adam Lejman, Robert Miklas, Jerzy Gempel, Stanisław Jeszka, Adam Jarosz, March 1999 - February 2002

The purpose of the project is consideration of the parasitic phemomena in the VLSI circuits and developing effective methods of modelling of these effects, taking into account disturbances of the real manufacturing process. The main research tasks are: developing new simulation methods of the parasitic phenomena like signal delays in interconnections of the RLC type; evolving effective models of the parasitic elements and methods of extraction of model parameters; developing methods of evaluation of the interactions in complicated connections configurations.

[Pro44] **High beam quality UV lasers for microelectronics** (Opracowanie ultrafioletowych laserów generujących wysokiej jakości wiązki promieniowania dla zastosowaś w mikroelektronice), Warsaw University of Technology, Institute of Microelectronics and Optoelectronics SPUB-M associated with the NATO-SfP, project leader: Tadeusz M.Adamowicz, co-workers: Krzysztof Dziściołowski, Wojciech Kwaśniewski, Wojciech Kamiśski, Jerzy Kśsik, Piotr Warda, 1999 - 2001

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.

[Pro45] **Novel dielectric layers for silicon carbide preserving their properties at elevated temperatures** (Nowe dielektryczne warstwy na węgliku krzemu zachowujźce swoje właźciwoźci w podwyższonych temperaturach), Warsaw University of Technology, Institute of Microelectronics and Optoelectronics, project leader: Jan Szmidt, co-workers: Aleksander Werbowy, Andrzej Jakubowski, Romuald B. Beck, Bogdan Majkusiak, Lidia Łukasiak, Jan Szmidt, Agnieszka Zaręba, Józef Maciak, Antoni Siennicki, Aleksandra Sokołowska, Mietek Bźkowski, Piotr Niedzielski, October 2000 - September 2003

The aim of the project is to investigate various dielectric layers on SiC and Si substrates at elevated temperatures (up to 500^{o}C). These are films of nitrides (AlN, BN) and oxides (Al_2O_3, TiO_2, Ta_2O_5).

[Pro46] **Ultrathin SiO2 and high-K dielectric layers for next generation ICs"** (Ultracienkie warstwy SiO2 oraz dielektryki o wysokiej przenikalnoźci elektrycznej dla układów scalonych nowej generacji), Warsaw University of Technology, Institute of Microelectronics and Optoelectronics, project leader: Andrzej Jakubowski, co-workers: Romuald B. Beck, Bogdan Majkusiak, Lidia Łukasiak, Jan Szmidt, Agnieszka Zaręba, Józef Maciak, Andrzej Wojtkiewicz, Krzysztof Domaźski, Sławomir Szostak, Jan Gibki, Jakub Walczak, Michał Korwin-Pawłowski, Jerzy Ruźyłło, October 2000 - September 2003

The ITRFS roadmap points out clearly that the required for next few MOS-ICs gate SiO2 thickness will fall as low as to the few monolayers only. Formation of such extreemely thin layers in a controlable and repeatable way is enormous challenge for silicon technology. The work will address few critical problems, namely: design of appropriate test structures, analysis of high-K dielectrics potentially suitable for the gate stack, investigation of begining stages of oxidation and nitridation, theoretical models of C-V behaviour and charge pumping allowing determination of the studies layers quality, development of the ultrathin layers technology (single layers) and double (ultrathin +additional – high-K). Part of the study is performed in collaboration with X-ion (company localed in France), which aims to develop a novel technology of ultrathin layers formation.

[Pro47] **Silicon-germanium (SiGe) – material for new generation CMOS devices** (Krzemogerman (SiGe) – materiał dla przyrzźdów CMOS następnej generacji), Warsaw University of Technology, Institute of Microelectronics and Optoelectronics, project leader: Małgorzata Jurczak, co-workers: Andrzej Jakubowski, Jan Szmidt, Romuald B. Beck, Bogdan Majkusiak, Lidia Łukasiak, Agnieszka Zaręba, Antoni Siennicki, Aleksander Werbowy, Tomasz Dębski, Sławomir Szostak, Jan Gibki, Jakub Walczak October 2000 - September 2003

[Pro47] Silicon-germanium significantly improves the speed of operation of both MOS and bipolar devices. The aim of the project is to develop a mathematical description of basic devices of contemporary CMOS and BiCMOS circuits (MOSFEET, HBT and MOSCAP) fabricated using the Si/SiGe heterostructure. The developed models will enable device optimization (e.g. profile and concentration of Ge in the SiGe base or channel). These models will also become the basis for extensive characterization of these devices, mainly through the analysis of I-V and C-V characteristics.

[Pro48] **Methodology of designing standard CMOS cells in case of realisation of low-voltage and low-power integrated circuits** (Metodyka tworzenia komórek standardowych CMOS dla potrzeb realizacji układów scalonych o niskim poborze prźdu i bardzo niskim napięciu zasilania), Warsaw University of Technology, Institute of Microelectronics and Optoelectronics, project leader: Marcin Sadowski, co-workers: Wiesław Kuźmicz, November 2000 - March 2002

The main research tasks of the project are: developing of new methodology of realisation and designing of electrical schemas and layouts of low-voltage low-power analogue and digital standard cells for standard bulk CMOS process. Developed methodology and standard cells will find application in design process of low-voltage Application Specific Integrated Circuits (ASIC's) with the aid of standard tools used for automatic design of ASIC's.

[Pro49] **Solid state micro-lasers for visible wavelengths** (Mikrolasery ciała stałego na zakres widzialny), Warsaw University of Technology, Institute of Microelectronics and Optoelectronics, project leader: Michał Malinowski, September 2000 – July 2002

Micro-lasers are miniature, diode-laser powered, solid state lasers of particularly simple design. The laser consists of a slice of active material polished to be plane parallel with mirrors applied directly to the crystal faces. For the operation of this structure thermal and gain-related waveguiding plays an important role. The program is oriented on the analysis and investigation of these devices at visible wavelength of the spectrum. Structures fabricated from Pr^{3+}, Ho^{3+}, Tm^{3+} and Er^{3+} activated YAG crystals are investigated.

[Pro50] **Modeling of Electron Mobility in the MOS SOI Transistor Channel** (Modelowanie ruchliwoźci elektronów w kanale tranzystora MOS SOI) Warsaw University of Technology, Institute of Microelectronics and Optoelectronics, project leader: Jakub Walczak, September 1999-October 2000

The subject of the project is the modeling of the electron mobility in the MOS SOI (*silicon-on-insulator*) transistor, partricularly in the case of the DG (*double gate*) SOI transistor, based on the quantum mechanics, i.e., based on the self consistent solution to Poisson and Schrödinger equations and calculation of the scattering rates accordingly to the perturbation theory. The analysis concerns main scattering mechanisms including the phonon scattering and surface roughness scattering.

4.3. Projects Granted by International Institutions

[Pro51] **SOI devices - modelling and characterisation** (Przyrźdy SOI – modelowanie i charakteryzacja), National Microelectronics Research Centre, Cork, Irland, project lider: Andrzej Jakubowski, co-workers: Tomasz Janik, Małgorzata Jurczak, Lidia Łukasiak, Jan Gibki, 1995 - 2000

This research project is devoted to fabrication, modeling and characterization of SOI devices. Currently the cooperation is focused on characterization of thin dielectric films in SOI devices by means of analysis of C-V curves and charge pumping.

[Pro52] **Modelling of thin film transistor and characterisation of DLC layers** (Modelowania tranzystorów cienkowarstwowych i charakteryzacja warstw DLC), National Physics Laboratory, New Delhi, India, project leader: Andrzej Jakubowski, co-workers: Bogdan Majkusiak, Lidia Łukasiak, Małgorzata Jurczak, 1998 - 2000

The project includes two main areas. The first one is modelling of the I-V characteristics of thin film transistors. The devices investigated in the project include fully depleted SOI transistors as well as amorphous- and poly-silicon TFTs. The other area of project is characterisation of thin DLC layers, as well as layers made of the other wide-bandgap semiconductors, e.g. BN and AIN.

[Pro53] **Investigation of bulk and waveguide dielectric structures activated by rare-earth ions for upconversion lasers,** (Badania kryształów domieszkowanych jonami ziem rzadkich dla zastosowań w laserach z konwersjź wzbudzenia), Laboratoire de Physico-Chimie des Materiaux Luminescents, Universite Claude Bernard Lyon 1, Polonium 0475 1/1999 CNRS, PW-NN/WZ/189/030/98, Warsaw University of Technology, Institute of Microelectronics and Optoelectronics, project leader: Michał Malinowski, co-workers: Adam Wnuk, Marcin Kaczkan, Ryszard Piramidowicz, 1999 - 2000

In this project various rare earth doped crystals and dielectric waveguides are investigated theoretically and experimentally for their potential use in upconversion lasers, that is devices producing radiation at wavelength shorter than this of the excitation source.

[Pro54] **Nanocrystalline dielectric layers for SiC electronic devices** (Nanokrystaliczne warstwy dielektryczne dla przyrzźdów elektronicznych na SiC), Industrial Microelectronics Center IMC/ACREO, Kista, Sweden, project leader: Jan Szmidt, co-workers: Romuald B. Beck, Andrzej Jakubowski, Aleksander Werbowy, 1999 - 2000

Main goal of the cooperation is to investigate applicability of nanocrystalline and amorphous layers obtained using plasma methods for protection, passivation and dielectric insulation of SiC devices. Project contains characterization of the important properties of deposited layers (structural, mechanical, electronic and optical) with the main objective of establishing technology anabling the utilisation of the named layers in SiC electronic devices. Plasma layers will be deposited at WUT on test devices and structures supplied by IMC. Characterization and evaluation will be done jointly and results will be published.

[Pro55] **Building Integration of Solar Technology** INCO/COPERNICUS (Integracja Technologii słonecznych z budownictwem), project no ICOP-DEMO-4080-98, WIP-Germany, Univ. Targoviste, Romania, Synthesis & Research, Greece, Warsaw University of Technology, Institute of Microelectronics and Optoelectronics, project leader Stanisław Pietruszko, October 1998 – October 2001

Design and installation of active and passive solar systems at the campus of the University of Targoviste in Romania. Design, installation and monitoring of photovoltaic systems.

[Pro56] **VILAB: Microelectronics Virtual Laboratory for Co-operation in Research and Knowledge Transfer** (INCO-Project 977133). September 1998-August 2001, project leader: Wiesław Kuźmicz, Project partners are:

- FhG-IIS/EAS (Germany)
- Technical University of Budapest (Hungary)
- Tallin Technical University (Estonia)
- Warsaw University of Technology (Institute of Microelectronics and Optoelectronics) (Poland)
- Institute of Electron Technology (Poland)
- Institute of Computer Systems (Slovakia)
- Slovak Technical University, Bratislava, (Slovakia)
- Darmstadt University of Technology (Germany)
- Linkoping University (Sweden)

The main objective of this project is to set up and maintain an east-West Virtual Laboratory (VL) for promoting co-operative research, development and training activities between the partner institutions in CEE and EC countries in design of dependable microelectronic systems which is one of the most dynamically developing application fields. The main result of the project will be: establishing of a new Research Network called Virtual Laboratory and new co-operative results in design, research and teaching achieved by joint use of resources and environment of the VL.

[Pro57] **Measurements of Superconducting and Dielectric Materials at Microwave Frequencies and Cryogenic Temperatures.** (Pomiary nadprzewodźćcych i dielektrycznych właźciwoźci materiałów w paźmie częstotliwoźci mikrofalowych i temperaturach kryogenicznych), Warsaw University of Technology, Institute of Microelectronics and Optoelectronics and NIST USA, project leader: Jerzy Krupka, co-worker: Zbigniew Rudkowski, financial support: M. Skłodowska - Curie Fund II (Fundusz polsko - amerykańskiej Fundacji im. M. Skłodowskiej - Curie), January 1999-December 2001

The objective of this project is to develop new techniques for measurements of electromagnetic properties of dielectric and superconducting materials at cryogenic temperatures and microwave frequencies. Specific goals of the project are as follows:
1) Measurements of thin dielectric films using extremely high Q whispering gallery dielectric resonator made of single crystal YAG or sapphire. We expect that using whispering gallery mode resonator it will be possible to measure electromagnetic properties of very low loss dielectric thin films deposited on its surface.
2) Measurements of the surface impedance of thin superconducting films.
3) Investigations few resonant techniques for measurements of the complex permittivity of thick and thin film ferroelectrics with and without electric bias. Split dielectric resonator and split re-entrant cavity techniques will be the methods of our investigations at room temperatures and split post sapphire resonator fixture operating at cryogenic temperatures.

The measurement programs proposed in this project will be directed at future commercial applications of dielectric and superconducting materials for both the Polish and American electronic industries. The applied research aspects of this work will be the development of new, accurate measurement methods of materials that can be used and properly qualified for total measurement uncertainties, as commercial standards.

[Pro58] **Metastability in Amorphous Silicon** (Metastabilność w krzemie amorficznym), (MEN/DOE-98-345) from U.S. Department of Energy and Polish Ministry of National Education in cooperation with the National Renewable Energy Laboratory, Golden, CO, USA (Maria Sklodowska-Curie Joint Fund II), Warsaw University of Technology, Institute of Microelectronics and Optoelectronics, project leader: Stanisław Pietruszko, 1999 - 2001

This project is directed at understanding the basic phenomena that limit the performance and reliability of thin-film amorphous solar cells. It is addressing a key fundamental research problem involving the degradation behavior of amorphous silicon. Investigation of the thermally and charge-induced metastability in unhydrogenated and hydrogenated undoped and doped amorphous silicon.

[Pro59] **Modelling of technological processes in microelectronics** (Modelowanie procesów technologicznych w mikroelektronice), Byelorussia State University of Informatics and Radioelectronics, Minsk, Byelorussia, project leader: Wiesław Kuąmicz, 2000,

The goal of the project is to develop new mathematical techniques and algorithms for simulation of manufacturing processes in microelectronics, particularly for manufacturing of CMOS integrated circuits, and for modeling of components of these circuits. This project differs from other works in that it treats statistical process and device simulation as a tool for integrated circuit design, not process engineering. The results of the project include application of the RSM methodology to statistical process simulation, development of new algorithms forsimulation of specific process steps in manufacturing of submicron VLSI integrated circuits and applications to circuit design.

[Pro60] **Defect modelling in IC's,** (Modelowanie defektów w układach scalonych), Lvov Technical Unversity, Ukraine, project leader: Wiesław Kuąmicz, co-worker: Witold Pleskacz, 2000,

The aim of the project is to develop new integrated circuit design, simulation and verification methods which take into account random structural defects in these circuits. Works in Lviv Polytechnic include manufacturing process simulation as well as circuit simulation methods while works at Warsaw University of Technology include modeling of components of integrated circuits and defect simulation. The results obtained so far include FIESTA software system for evaluation of probabilities of logic faults in digital CMOS Ics with application to test generation.

[Pro61] **High beam quality UV lasers for microelectronics** (Opracowanie ultrafioletowych laserów generujących wysokiej jakości wiązki promieniowania dla zastosowaą w mikroelektronice), NATO Science for Peace Programme, Project NATO-SfP-971989-Excimer Lasers, project co-director: Tadeusz M.Adamowicz, co-workers: Krzysztof Dziąciołowski, Wojciech Kwaśniewski, Wojciech Kamiąski, Jerzy Kąsik, 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).

[Pro61] 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.

[Pro62] **Researches on metal vapour - noble gas discharges for UV laser generation** (Badania wyładowaą 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 Dziąciołowski, Wojciech Kamiąski, 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.

[Pro63] **Diagnostics of noble gas-metal vapour systems for laser operation** (Diagnostyka ośrodków laserujących na mieszaninach gazów szlachetnych i par metali), Department of Physics, Eindhoven University of Technology, The Netherlands, project leader: Tadeusz M.Adamowicz,1998 - 2000

Study of cataphoresis in noble gas mixtures and formation of negative ions in discharge plasmas. Measurements of metal atom densities in hollow cathode discharges used for laser generation. Investigations of He^3 isotope influence on laser generation in He-metal ion systems.

[Pro64] **Development and assessment of new standard techniques for complex permittivity measurements** (Rozwój i atestacja nowych wzorcowych metod pomiaru zespolonej przenikalności elektrycznej), Warsaw University of Technology, Institute of Microelectronics and Optoelectronics and Centre for Electromagnetic Metrology, National Physical Laboratory, Teddington, U.K., project leader: Jerzy Krupka, 2000

The aim of the project is development and assessment of a split post dielectric resonator techniques for complex permittivity measurements of dielectrics at frequency range 1-10 GHz. Our goal is is to evaluate both theoretically and experimentally (by inercomparision with other NPL techniques) its uncertainties in order use this method as a standard one in 1-10 GHz frequency range.

[Pro65] **Calculation of the gas density distribution in the XHV chamber of the vacuum primary standard CE3 at PTB** (Obliczenia rozkładu gęstoźci strumienia gazu w komorze pomiarowej XHV, próżniowego układu metrologicznego w PTP), Warsaw University of Technology, Institute of Microelectronics and Optoelectronics and PTP Germany, project leader: Piotr Szwemin, co-workers: Marek Niewiźski, Karol Szymaźski, April 2000 - December 2000

The new vacuum primary standard device has been established in PTP Germany. Because the shape of the calibration chamber is complicated, the only way to calculate the correction factor of orifice conductance was simulation.

The calculations take 3 steps: obtaining transmission probability and conductance of orifice system; determining the gas density distribution on the wall of XHV chamber.

[Pro66] **Investigations of degradation phenomena in termistors with negative thermal coefficient of resistance** (Badanie zjawisk starzeniowych termistorów z ujemnym temperaturowym współczynnikiem opornoźci) Institute of Materials of Science-Production Company “Karat”, Lvov, Ukraine project leader: Julitta Pogorzelska, co-worker: Józef Maciak, April 1998 – April 2002

The aim is technology development, investigation of physical phenomena in materials is long time period and finding materials with small degradation, which will enable correct element technology.

4.4. Other Projects

[Pro67] **Formation of silicon layers be means of laser zone melting recrystallization (LZMR) and their characterization** (Wytwarzanie warstw krzemowych metodź strefowej rekrystalizacji laserowej LZMR i ich charakteryzacja), project leader: Romuald B. Beck, co-workers: Krzysztof Domaźski, Witold Ciemiewski, Kazimierz Dalbiak, January 2000 – December 2001.

The aim of this work is to apply the laser annealing technique to manufacturingof the SOI (silicon-on-insulator) substrates. Laser zone melting recrytsallization has been successfully optimized in Lviv Politechnika. IMiO PW, on the other hand, with its technological facilities is capable of perfoming all other processes needed for this production technique. It is expected that produced by these method substrates will be superior to other techniques (e.g. SIMOX) in terms of electrophysical properties of the silicon top layer (body).

5. DEGREES AWARDED

5.1. Ph.D. Degrees

[PhD1] Piotr Witoński**, Modelling of nonlinear operation in volume and hollow-waveguide lasers with Gaussian output mirror,** (Modelowanie generacji promieniowania w laserach objźtoźciowych i falowodowych z transmisyjnym zwierciadłem o gaossowskim profliu współczynnika odbicia), supervisor: Paweł Szczepański, 18 January 2000.

[PhD2] Zbigniew Pieńkowski, **Analysis of Operation and Calibration Conditions of Six-Port Network Analyser with Homodyne Phase-Sensitive Detectors** (Analiza warunków pracy i kalibracji szeźciowrotowego analizatora obwodów z fazoczułymi detektorami homodynowymi), supervisor: Bogdan Galwas, 5 December 2000.

[PhD3] Ryszard Piramidowicz**, Conditions of the visible emission excitation in Pr^{3+} doped dielectric laser media** (Warunki wzbudzania emisji promieniowania w zakresie widzialnym w dielektrycznych oźrodkach laserowych domieszkowanych jonami Pr^{3+}), supervisor: Michał Malinowski, 5 December 2000, distinction

5.2. M.Sc. Degrees

[MSc1] Przemysław Baszak, **Badanie dynamicznych właściwości ciekłokrystalicznych przetworników holograficznych,** advisor Hanna Górkiewicz-Galwas, excellent

[MSc2] Tomasz Bednarczyk, **Projekt systemu fotowoltaicznego dołączonego do sieci elektroenergetycznej,** advisor Stanisław Pietruszko, excellent

[MSc3] Paweł Borkowski, **Łącze optyczne do cyfrowej tramsmisji danych,** advisor Jerzy Piotrowski, good

[MSc4] Grzegorz Chlebowski, **Badanie autonomicznego systemu fotowoltaicznego,** advisor Stanisław Pietruszko, excellent

[MSc5] Ryszard Ciupiński, **Analiza promieniowania szumów w wielomodowych wzmacniaczach optycznych,** advisor Jerzy Kruszewski, excellent

[MSc6] Piotr Danielski, **Elektromigracja w połączeniach wykonywanych klejami elektrycznie przewodzącymi,** advisor Ryszard Kisiel, excellent

[MSc7] Dariusz Dźbski, **Badania lasera jonoweego na parach cynku,** advisor Tadeusz Adamowicz, excellent

[MSc8] Przemysław Dmochowski, **Techniki abnalizy układów MUS w warunkach pracy nieliniowej,** advisor Jerzy Piotrowski, excellent

[MSc9] Maher El-daly, **Modelowaanie niektórych parametrów przyrządów półprzewodnikowych wykorzystujących krzemogerman,** advisor Andrzej Jakubowski, excellent

[MSc10] Jakub Gawkowski, **Składowanie i wyszukiwanie informacji pozyskanej z analizy zbiorów obrazów o duąej liczności,** advisor Hanna Górkiewicz-Galwas, excellent

[MSc11] Tomasz Grudniewski, **Analiza właściwości ciekłokrystalicznych przetworników obrazu w zastosowaniach do korelatorów, zwierciadeł, przesuwników fazowych,** advisor Hanna Górkiewicz-Galwas, excellent

[MSc12] Marcin Jakubczyk, **Badanie moąliwości wykorzystania światłowodu do konstrukcji czujnika poziomu cieczy,** advisor Jerzy Kalenik, excellent

[MSc13] Włodzimierz Jońca, **Zastosowanie algorytmu genetycznego w analizie układów elektronicznych,** advisor Wiesław Kuźmicz, very good

[MSc14] Radosław Józwik, **ąwiatlowodowy czujnik wilgotności względnej,** advisor Maria Bebłowska, excellent

[MSc15] Wojciech Kamiński, **Badania procesów prowadzących do uzyskania akcji laserowej w laserach jonowych na parach metali,** advisor Tadeusz Adamowicz, excellent

[MSc16] Marek Kieczko, **Sterowanie procesem utwardzania klejów elektrycznie przewodzących z zastosowaniem technik planowania eksperymentów,** advisor Ryszard Kisiel, good

[MSc17] Artur Kokoszkiewicz, **Optymalizacja kodera sekwencji obrazów cyfrowych zgodnego ze standardem na potrzeby systemu akwizycji,** advisor Jerzy Woźnicki, excellent

[MSc18] Krzysztof Kosiorek, **Pomiary średnicy światłowodów,** advisor Ryszard Kisiel, good

[MSc19] Adam Kowalczyk, **Edytor topografii układów scalonych dla środowiska Windows,** advisor Wiesław Kuźmicz, excellent

[MSc20] Monika Kowalska, **Zagadnienie emisji promieniowania krótkofalowego w laserowych ośrodkach aktywowych praezodymem,** advisor Michał Malinowski, excellent

[MSc21] Hoai Anh Le, **Badanie moąliwości wykorzystania czujnika światłowodowego do konstrukcji wagi,** advisor Jerzy Kalenik, good

[MSc22] Dariusz Łabźdzki, **Wykorzystanie systemu dyskretyzacji obrazu do oceny jakości analizatorów obrazu,** advisor Jerzy Woźnicki, excellent

[MSc23] Norbert Ługowski, **Analiza kodu w języku VHDL pod kątem optymalizacji syntezy logicznej na przykładzie modem kompresji i dekompresji danych,** advisor Elźbieta Piwowarska, excellent

[MSc24] Aleksander Novakovski, **Analiza dynamicznej pracy laserów DFB z jednoczesną modulacją współczynnika załamania i współczynnika strat,** advisor Paweł Szczepański, excellent

[MSc25] Tomasz Oleszczak, **Algorytmy ekstrakcji obszarów krytycznych na zwarcia i rozwarcia dla wybieranych ścieąek w topografii układu scalonego,** advisor Witold Pleskacz, excellent

[MSc26] Zofia Orzechowska, **Badanie wpływu na parametry transportu nośników w cienkich warstwach krzemu amorficznego,** advisor Stanisław Pietruszko, excellent

[MSc27] Robert Paszkiewicz, **Analiza własności statystycznych światła generowanego w laserach DBR/DFB z siatką o symetrii cylindrycznej z uwzględnieniem nadmiaroweego szumu kwantowego,** advisor Anna Tyszka-Zawadzka, excellent

[MSc28] Mariusz Piwnik, **Modułowy system zdalnej akwizycji obrazu o architekturze klient – serwer,** advisor Hanna Górkiewicz-Galwas, good

[MSc29] Paweł Podolski, **Układ sterowania zespołem ąródeł wynuszająco- pomiarowym,** advisor Zbigniew Pióro, excellent

[MSc30] Piotr Ptak, **Analiza warunków pracy mikrofalowego oscylatora z tranzystorem FET, przestrajanego waraktorem,** advisor Bogdan Galwas, good

[MSc31] Robert Rajkowski, **Planarny nadajnik mikrofalowy zasilany łączem optycznym,** advisor Bogdan Galwas, excellent

[MSc32] Andrzej Rudko, **Układ sterowania zespołem ąródeł wymuszająco-pomiarowych – sprząt,** advisor Andrzej Jakubowski, excellent

[MSc33] Dariusz Sarna, **Implementacja algorytmu sterowania rozrusznikiem serca na mikroprocesorze ARM,** advisor Wiesław Kuźmicz, excellent

[MSc34] Artur Skoneczny, **Hydrostatyczny światłowodowy czujnik poziomu cieczy,** advisor Jerzy Kruszewski, excellent

[MSc35] Piotr Słoniowski, **Struktury danych i biblioteka procedur do reprezentacji masek z uwzględnieniem zaburzeą procesu odwzorowania,** advisor Elńbieta Piwowarska, fairly good

[MSc36] Norbert Somow, **Analiza współczynnika sprzążenia w planarnych strukturach laserowych DFB posiadających rezonator o symetrii cylindrycznej,** advisor Paweł Szczepański, excellent

[MSc37] Remigiusz Stachura, **Cyfrowe łącze optyczne ze światłowodem wielomodowym,** advisor Andrzej Piotrowski, good

[MSc38] Robert Szarejko, **Optymalizacja warunków pracy jonowego lasera Ar-Kr przeznaczonego do spektroskopii ramanowskiej,** advisor Jerzy Kńsik, excellent

[MSc39] Maciej Szatkowski, **Zastosowanie metody Newtona w transmisyjno - odbiciowych pomiarach zespolonej przenikalności elektrycznej i magnetycznej,** advisor Jerzy Krupka, very good

[MSc40] Magdalena Szuflińska, **Badanie przejśą optycznych jonów Ho3+ w kryształach YAG,** advisor Michał Malinowski, excellent

[MSc41] Konrad ńwitalski, **Analiza nadmiarowego szumu w laserach DFB posiadających rezonator o symetrii cyrkularnej,** advisor Paweł Szczepański, excellent

[MSc42] Sylwia Tarasiuk, **Progowa analiza generacji promieniowania w laserach DBR/DFB o symetrii cyrkularnej,** advisor Paweł Szczepański, excellent

[MSc43] Andrzej Walczak, **Analiza warunków pracy i badania łącza optycznego z multipleksacją na podnośnej,** advisor Bogdan Galwas, excellent

[MSc44] Janusz Zabłocki, **Synteza i weryfikacja układów analogowo-cyfrowych projektowanych z uąyciem języków opisu sprzątu,** advisor Elńbieta Piwowarska, very good

[MSc45] Sławomir Zych, **Dystrybucja danych multimedialnych w lokalnych sieciach komputerowych,** advisor Hanna Górkiewicz-Galwas, very good

5.3. B.Sc. Degrees

[BSc1] Artur Brodowski, **Opracowanie programu ekstrakcji parametrów połączeą miądzyukładowych z topografii układu scalonego,** advisor Elńbieta Piwowarska, excellent

[BSc2] Artur Budziński, **Obliczenie przewodności elementarnych za pomocą metody Monte-Carlo o wysokiej precyzji,** advisor Piotr Szwemin, pass

[BSc3] Rafał Gładysz, **Program do wizualizacji wyników symulacji procesów wytwarzania układów scalonych,** advisor Andrzej Pfitzner, very good

[BSc4] Marcin Jarszak, **Rekonfiguralny model automatu sterującego,** advisor Zbigniew Jaworski, excellent

[BSc5] Mirosław Jurek, **Realizacja układów cyfrowychw technice komórek atandardowych,** advisor Mirosław Grygolec, very good

[BSc6] Artur Kokoszka, **Oprogramoweanie systemu do zdalnego rozpoznawania kształtu,** advisor Mikołaj Baszun, excellent

[BSc7] Mirosław Kuczkowski, **Demodulator cząstotliwości - projekt, wykonanie i badanie modelu,** advisor Bogdan Galwas, very good

[BSc8] Robert Kurczyński, **Badanie tranzystorów cienkowarstwowych pod kątem przydatności w aktywnych matrycach wyswietlaczy ciekłokrystalicznych (AMLCD),** advisor Stanisław Pietruszko, very good

[BSc9] Adam Orzechowski, **Struktury próbne dla badaą efektów interferencji funkcji falowych elektronu,** advisor Bogdan Majkusiak, excellent

[BSc10] Andrzej Rutkowski, **Symulacja komputerowa przetworników elektroakustycznych,** advisor Mikołaj Baszun, excellent

[BSc11] Michał Skalski, **Uruchomienie i oprogramowanie stanowiska diagnostycznego,** advisor Romuald Beck, excellent

[BSc12] Mariusz Sochacki, **Charakteryzacja diod Schottky'ego na wągliku krzemu,** advisor Jan Szmidt, excellent

[BSc13] Marcin Strzyńewski, **Zastosowanie protokołu RTp (Real Time Transfer Protocol) do transmisji sekwencji obrazów cyfrowych zgodnie ze standardem JPEG (ISO),** advisor Grzegorz Kukiełka, good

[BSc14] Mateusz ńmietana, **Badanie sprzążenia światłowodu grubordzeniowego z diodą superluminescencyjną,** advisor Jerzy Kalenik, excellent

[BSc15] Marcin Tomczak, **Specjalizowany edytor plików sterujących programu ekstrakcji schematu elektrycznego w środowisku WINDOWS95,** advisor Adam Wojtasik, excellent

[BSc16] Antoni Warszawik, **Opracowanie półprzewodnikowego systemu fotowoltaicznego do konwersji promieniowania,** advisor Stanisław Pietruszko, excellent

[BSc17] Arkadiusz Wojtowicz, **Charakteryzacja struktur MOS z ultracienkim tlenkiem,** advisor Bogdan Majkusiak, excellent

[BSc18] Maciej Byzdra, **Udoskonalenie i oprogramowanie stanowiska do pomiarów tranzystorów cienkowarstwowych,** advisor Stanisław Pietruszko, very good

[BSc19] Marcin Całkiewicz, **Ogranicznik mocy mikrofalowej,** advisor Jerzy Piotrowski, excellent

[BSc20] Robert Chlebowski, **Zaprojektowanie i uruchomienie urzsądzenia do rozpoznawania punktu przebicia maski cieniowej kineskopu w procesie trawienia,** advisor Hanna Górkiewicz-Galwas, excellent

[BSc21] Piotr Daniszewski, **Aplikacja procedur przetwarzania obrazów pracujących w technologii klient www/serwer,** advisor Grzegorz Kukiełka, good

[BSc22] Ewa Demska, **Szerokopasmowy wzmacniacz tranzystorowy zrealizowany w technologii hybrydowej- projekt, wykonanie i badanie modelu,** advisor Sławomir Palczewski, very good

[BSc23] Joseph Gandiwa Dinha, **Uruchomienie i oprogramowanie stanowiska do pomiarów metodą quasi-staatyczna,** advisor Romuald Beck, pass

[BSc24] Emil Dusiński, **Wytwarzanie i charakterystyka cienkich warstw amorficznych półprzewodników i dielektryków,** advisor Jan Szmidt, excellent

[BSc25] Robert Gielmuda, **Nadajnik z cyfrową modelową smplitudy do łącza optycznego: projekt. badanie i wykonanie,** advisor Bogdan Galwas, excellent

[BSc26] Dariusz Główczyński, **Oprogramowanie systemu do zdalnego rozpoznawania kształtu,** advisor Mikołaj Baszun, very good

[BSc27] Arkadiusz Gmitrzak, **Technologia dołączania kontaktów podwyższonych przy zastosowaniu izotropowych klejów przewodzących,** advisor Zbigniew Szczepański, excellent

[BSc28] Wojciech Gniewek, **Odbiornik z cyfrową modulacją amplitudą łącza optycznego:projekt, wykonanie i badanie,** advisor Bogdan Galwas, very good

[BSc29] Marek Hodzyński, **Badanie jednoczęstotliwościowej pracy lasera argonowego,** advisor Piotr Warda, excellent

[BSc30] Andrzej Jeżewski, **Badania parametrów ośrodków laserowych na mieszaninach gazów szlachetnych i par metali,** advisor Tadeusz Adamowicz, good

[BSc31] Radosław Klimek, **Analiza numeryczna promieniowania propagującego się w poczatkowym odcinku włókna optycznego,** advisor Michał Borecki, excellent

[BSc32] Urszula Kołakowska-Szczypiń, **Segmentacja obszarowa cyfrowych obrazów mikroskopowych parametrów biologicznych do badania zmian ukrwienia tkanki,** advisor Hanna Górkiewicz-Galwas, excellent

[BSc33] Wojciech Matysik, **Program pośredniczący między symulatorami technologii i numerycznym symulatorem elementów układów scalonych,** advisor Andrzej Pfitzner, excellent

[BSc34] Wiesław Rossa, **Konfiguracja komputerowego systemu przetwarzania i analizy mikroskopowych obrazów cyfrowych tkanki biologicznej (na przykładzie tkanki myszy),** advisor Grzegorz Kukiełka, excellent

[BSc35] Ireneusz Sobota, **Model w języku VHDL interfejsu mierniczego IEEE 488,** advisor Elżbieta Piwowarska, excellent

[BSc36] Rafał Szczźniak, **Badanie parametrów transportu nośników w cienkich warstwach krzemu amorficznego,** advisor Stanisław Pietruszko, good

[BSc37] Grzegorz Szczurek, **Metody dekompozycji kształtu obiektu z zastosowaniem metod morfologii matematycznej,** advisor Grzegorz Kukiełka, excellent

[BSc38] Michał Wisz, **Badanie transmisji światła w ciekłych ośrodkach rozparaszających,** advisor Maria Bebłowska, good

[BSc39] Janusz Zambrzycki, **Zastosowanie cyfrowych metod przetwarzania obrazów do analizy uszkodzeń połączeń w układach scalonych,** advisor Grzegorz Kukiełka, very good

6. PUBLICATIONS

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

Number	Authors	Journal	Title, volume, year, pages
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[Pub2]	M. Jurczak, T. Skotnicki	IEEE Transaction on Electron Devices	„Silicon-on-nothing (SON) an innovative process for advanced CMOS", vol. 47, No 11 (2000) 2179-2187.
[Pub3]	B. Majkusiak, M.H. Badri	IEEE Transaction on Electron Devices	„Semiconductor thickness and back-gate voltage effects on the gate tunnel current in the MOS/SOI system with an ultrathin oxide", vol. 47, No 12 (2000) 2347-2351.
[Pub4]	M. Sadowski, D. Tomaszewski	Microelectronics Reliability	An efficient approach to the measurement and characterization of MOSFET capacitances, vol 40 (2000) str. 1045-1049
[Pub5]	J.Kruszewski, M.Borecki	OPTO- ELECTRONICS REVIEW	"Radiation amplification identification in optical fibre amplifiers", (2000) , vol 8 No 2.,147-151.
[Pub6]	M. Borecki, J.Kruszewski	Optica Applicuta	"Concepts of fibre optic intensity sensore for liquid level measurement",(2000), vol.XXX.No1, 141- 150.
[Pub7]	S. M. Pietruszko	Renewable Energy,	Renewable Energy In Poland – Perspective For The New Millennium VI(WREC2000) pp1530-1535
[Pub8]	S. M. Pietruszko M. Kostana	OPTO- ELECTRONICS REVIEW	„Formation and Relaxation of Metastable Defects in Amorphous Silicon", 8(4), 385-7 (2000)
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[Pub12]	M.Malinowski, A.Mossakowska-Wyszyńska, R.Piramidowicz, P.Szczepański, A.Tyszka-Zawadzka, Z.Furkacz, I.Pracka	Acta Physica Polonica A	Modelling of blue wavelength Praseodymium waveguide lasers, 2000, vol.97 , No 2, 295-313
[Pub13]	G.Bano,L.Szalai, K.Kutasi, P.Hartmann,Z.Donko, K.Rozsa, A.Kiss, T.M.Adamowicz	Applied Physics B, Laser and Optics	Operation characteristics of the Au-II 690-nm laser transition in a segmented hollow cathode discharge, 2000, 70, 521-525
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[Pub15]	M.S.Stefanova, P.M.Pramaatarovad, T.M.Adamowicz, W.Kamiński	Journal of Physics: D Applied Physics	Influence of the ^{3}He isotope on the He-Kr hollow cathode laser, 2000, 33, 1-7
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[Pub18]	D. Tomaszewski, L. Łukasiak, A. Zaręba, A. Jakubowski	Journal of Telecommunications and Information Technology	An impact of frequency on capacitances of partially-depleted SOI MOSFETs, 3,4 (2000) 67-71.
[Pub19]	J. Gibki, J. Kźtcki, J. Ratajczak, L. Łukasiak, A. Jakubowski, D. Tomaszewski	Journal of Telecommunications and Information Technology	Characterization of SOI fabrication process using gated-diode measurements and TEM studies, 3,4 (2000) 81-83.
[Pub20]	T. Janik, B. Majkusiak	Electron Technology	Prediction of I-V characteristics of double-gate SOI MOSFETS with ultrathin semiconductor layer, vol. 33, No 4 (2000) 567-570.
[Pub21]	L. Łukasiak, A. Jakubowski, S. Szostak	Electron Technology	A new model of three-level charge pumping, vol. 33, No4, (2000)), 558-566
[Pub22]	M. Blyzniuk, W. Pleskacz, M. Lobur, W. Kuzmicz	VISNIK Derzavnogo universitetu "Lvivska Politechnika" - Radioelektronika ta Telekomunikacii,	Iídentifikacija ta ocinka jmovirnost pojavi riznich tipiv funkconalnich pomilok, viklikanich tockovimi defektami u NVIS, no. 387, Lviv 2000, str. 355-364, ISSN 0321-0499.
[Pub23]	M. Borecki, J. Kruszewski, K. Kopczyźski	Electron Technology	The Simulation of Laser Correction of thick Film Resistors With The Boundary Elements Method Use, vol 33, No.4 ss. 571-576
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[Pub25]	R. Geyer, J. Krupka, M. Tobar,	Electronic Ceramic Materials and Devices in Ceramic Transactions, Published by The American Ceramic Society, 2000	Microwave dielectric properties of low-loss materials at low temperature, vol.106, ss.219-226

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[Pub26]	R. Kisiel	Proc. of the 2000 Workshop on Polymeric Materials for Microelectronics and Photonics Applications: Mechanics, Physics, Reliability, Processing, London, UK, December 4-5, 2000	Electrically Conductive Adhesive Formulations for SMT Applications
[Pub27]	J.Felba, K.Friedel, R.Kisiel	Proc. of XXIV International Conference IMAPS POLAND 2000, Rytro, September 25-29	The Future Alternatives to Tin-Lead in PCB assembly, pp. 27-45
[Pub28]	R. Kisiel J. Kalenik	" Proc. of XXIV International Conference IMAPS POLAND 2000, Rytro, September 25-29, 2000,	Lead Free Solder Joint Properties in High Temperature Applications, pp.193-198
[Pub29]	Z. Jaworski, W. Kuźmicz, M. Sadowski, D. Sarna, A. Wałkanis, A. Wielgus, A. Wojtasik	1st Annual International IEEE-EMBS Special Topic Conference on Microtechnologies in Medicine & Biology, Lyon, France, Oct. 2000	VLSI Implementations of Fuzzy Logic Controllers for Rate-Adaptive Pacemakers, pp.475-478
[Pub30]	W. Kuźmicz	2000 IEEE 1st International Symposium on Quality Electronic Design, San Jose, California, USA, March 2000	Internet-based Virtual Manufacturing: a Verification Tool for IC Designs, pp. 315-319

[Pub31]	M. Blyzniuk, W. Kuźmicz, M. Lobur, T. Panchak, W. Pleskacz	Collection of papers of the International Symposium on Contemporary Computing in Ukraine – CCU'2000, Ukraina, Lwów-Slavsko, Feb. 2000	Graphical User Interface of FIESTA – Software for Faults Identification and Estimation of Testability of VLSI Cicuits, pp. 127-136
[Pub32]	J. Krupka, A. P. Gregory, O. C. Rochard, and R. N. Clarke,	International Conf. 6-emes Journees de Caracterisation Mico-ondes et Materiaux (JCMM'2000), Paris 22-24 March, 2000.	Le split resoantor et d'aautres techniques de mesures" pp.101-104 R
[Pub33]	J. Krupka, A P Gregory, O C Rochard, R N Clarke, B Riddle,J Baker_Jarvis	International Conference on Microwave Materials and Thair Applications-MMA2000, Bled, Slovenia, Aug. 30	Uncertainty of Complex Permittivity Measurments by Split-Post Dielectric Resonator Technique
[Pub34]	K. Klimczk, J. Szmidt, A. Werbowy, A. Olszyna	Procedings of VII Konferencji Naukowej ELTE 2000 Wyd. ITM Pol. Wroc.	Warstwy azotku aluminium na wńgliku krzemu, 238-241.
[Pub35]	M. Sochacki, M. Bakowski, J. Szmidt, A. Werbowy, M.T.Htung Aung	Procedings of VII Konferencji Naukowej ELTE 2000 Wyd. ITM Pol. Wroc.	Wpływ pasywacji diod Schottky'ego na podłońach 4H-SiC na włańciwońci struktur, 242-245.
[Pub36]	P. Brzozowski, E.Nossarzewska-Orłowska, D. Lipiński, R.B. Beck, K. Domański	Procedings of VII Konferencji Naukowej ELTE 2000 Wyd. ITM Pol. Wroc.	Epitaksja krzemu na krzemie porowatym, 107 – 110.
[Pub37]	A.Werbowy, M. Elert, J. Szmidt, K. Zdunek	Procedings of VII Konferencji Naukowej ELTE 2000, Wyd. ITM Pol. Wroc.	Wytwarzanie i niektóre włańciwońci cienkich warstw a-SiC na podłońu Si, 246-249.
[Pub38]	E. Dusiński, J. Szmidt, A. Werbowy, K. Zdunek, P. Wiencek	Procedings of VII Konferencji Naukowej ELTE 2000, Wyd. ITM Pol. Wroc.	Wytwarzanie warstw Al_2O_3 metodń reaktywnej plazmy i ich charakterystyka, 311-314.
[Pub39]	L. Łukasiak, Jakubowski, R.B. Beck, A. Wojtkiewicz, M. Korwin-Pawłowski, J. Ruńyłło	Procedings of VII Konferencji Naukowej ELTE 2000, Wyd. ITM Pol. Wroc.	Dielektryki bramkowe dla nowych generacji układów scalonych, 343-351.
[Pub40]	B. Majkusiak	Procedings of VII Konferencji Naukowej ELTE 2000, Wyd. ITM Pol. Wroc.	Zjawiska fizyczne i przyrzńdy nanoelektroniki, 352-360.
[Pub41]	K. Domański, Wojtkiewicz, A. Kudła, R.B. Beck, T. Łozowski P. Brzozowaski, E.Nossarzewska-Orłowska,	Procedings of VII Konferencji Naukowej ELTE 2000, Wyd. ITM Pol. Wroc.	Charakteryzacja porowatego krzemu i jego tlenków, 99-102.
[Pub42]	J. Szmidt, M. Bńkowski, A. Sokołowska, A. Jakubowski	Procedings of VII Konferencji Naukowej ELTE 2000, Wyd. ITM Pol. Wroc.	Warstwy dielektryczne dla przyrzńdów wytwarzanych w wńgłiku krzemu, 365-375.
[Pub43]	L. Łukasiak, P. Roman, J. Ruńyłło, A. Jakubowski	Procedings of VII Konferencji Naukowej ELTE 2000, Wyd. ITM Pol. Wroc.	Charakteryzacja podłońy SOI metodń surface charge profiling, 406-409
[Pub44]	S. Szostak, L. Łukasiak, A. Jakubowski	Procedings of VII Konferencji Naukowej ELTE 2000, Wyd. ITM Pol. Wroc.	Charaketryzacja tranzystorów MOS-SOI metodń pompowania ładunku, 410-413.
[Pub45]	J. Gibki, J. Kńtcki, J. Ratajczak, L. Łukasiak, D. Tomaszwski, A. Jakubowski	Procedings of VII Konferencji Naukowej ELTE 2000, Wyd. ITM Pol. Wroc.	Elektryczne i elektronomikroskopowe badanie czńściowo zubońonych struktur SOI, 422-425.
[Pub46]	J. Walczak, B. Majkusiak, T. Janik	Procedings of VII Konferencji Naukowej ELTE 2000, Wyd. ITM Pol. Wroc.	Fizyczne modelowanie ruchliwońci elektronów w kanale tranzystora GAA SOI, 433-436

[Pub47]	D. Tomaszewski, A.Zaręba, L. Łukasiak, A.Jakubowski, J. Marczewski	Procedings of VII Konferencji Naukowej ELTE 2000, Wyd. ITM Pol. Wroc.	Metoda nie-quasi-statyczna w modelowaniu charakterystyk C-V częściowo zubożonych tranzystorów MOS SOI, 470-473.
[Pub48]	D. Tomaszewski, L. Łukasiak, A. Zaręba, J. Gibki, A. Jakubowski	Procedings of VII Konferencji Naukowej ELTE 2000, Wyd. ITM Pol. Wroc.	Małosygnałowy model częściowo zubożonych tranzystotów MOS SOI i identyfikacja jego parametrów, 458-461
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[Pub51]	Z. Lisik, J. Szmidt, J. Podgórski	Procedings of VII Konferencji Naukowej ELTE 2000, Wyd. ITM Pol. Wroc.	SMIS – nowa struktura unipolarna, 533-536
[Pub52]	B. Majkusiak	Procedings of VII Konferencji Naukowej ELTE 2000, Wyd. ITM Pol. Wroc.	Stałoprźdowy model diody tunelowej MOS (n^+p)/SOI, 537-540
[Pub53]	A. Zaręba, A. Jakubowski	Procedings of VII Konferencji Naukowej ELTE 2000, Wyd. ITM Pol. Wroc.	Wpływ nierównomiernego rozkładu koncentracji domieszek w bazie tranzystora HBT na jego parametry, 563-566
[Pub54]	D. Tomaszewski, L. Łukasiak, J. Gibki, A. Jakubowski	Procedings of VII Konferencji Naukowej ELTE 2000, Wyd. ITM Pol. Wroc.	Wpływ zjawisk fizycznych na admitancje częściowo zubożonych tranzystorów MOS SOI, 567-570
[Pub55]	J. Gibki, D. Tomaszewski, L. Łukasiak, A. Jakubowski	Procedings of VII Konferencji Naukowej ELTE 2000, Wyd. ITM Pol. Wroc.	Wyznaczanie rekombinacyjnego życia noźników w całkowicie zubożonych strukturach SOI, 571-573
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[Pub59]	T. Dębski, W. Barth, K. Domaźski, D. Tomaszewski, P. Grabiec, I. Rangelow, A. Jakubowski	Procedings of VII Konferencji Naukowej ELTE 2000, Wyd. ITM Pol. Wroc.	Piezorezystywne sensory dla mikroskopii sił atomowych –symulacje numeryczne przy użyciu oprogramowania do symulacji procesów technologicznych VWF (virtual wafer FAB),1263-1266
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[Pub61]	W. Pleskacz, T. Oleszczak, D. Kasprowicz, W. Kuźmicz	Procedings of VII Konferencji Naukowej ELTE 2000, Wyd. ITM Pol. Wroc.	Wpływ defektów produkcyjnych na błędy logiczne i testowalnoźź cyfrowych układów CMOS, pp. 559-562
[Pub62]	M. Sadowski, D. Tomaszewski	Procedings of VII Konferencji Naukowej ELTE 2000, Wyd. ITM Pol. Wroc.	Efektywna charakteryzacja pojemnoźci tranzystora MOS, pp. 418-421
[Pub63]	A. Pfitzner, A. Lejman	Procedings of VII Konferencji Naukowej ELTE 2000, Wyd. ITM Pol. Wroc.	Model dyfuzji implementacyjnej dla symulacji statystycznej układów scalonych, pp. 478-481
[Pub64]	J. Laskowski, A. Pfitzner	Procedings of VII Konferencji Naukowej ELTE 2000, Wyd. ITM Pol. Wroc.	Metoda generacji zaburzeź parametrów w symulacji statystycznej układów scalonych, pp. 466-469

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[Pub66]	J. Dawidczyk, B. A. Galwas	Procedings of VII Konferencji Naukowej ELTE 2000, Wyd. ITM Pol. Wroc.	Efekty mieszania optyczno – mikrofalowego na foto-detektorach PIN i MSM, 2000, pp. 795-798.
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[Pub71]	G. Kukiełka, J. Woźnicki	Procedings of VII Konferencji Naukowej ELTE 2000, Wyd. ITM Pol. Wroc.	Metody detekcji ruchu obiektów w przypadku sekwencji obrazów cyfrowych, pp. 836 - 849
[Pub72]	P. Szwemin	Procedings of VII Konferencji Naukowej ELTE 2000, Wyd. ITM Pol. Wroc.	Porównanie włańciwońci generatorów liczb losowych z punktu widzenia uńycia ich do symulacji układów próńniowych pp. 981-985
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[Pub182]	B. J. Bałan	Nowa Medycyna, nr 4/2000	Angiogeneza – problem na miarń XXI wieku, pp. 41-46
[Pub183]	G. Kukiełka, J.Woźnicki	Politechnika Warszawska – Program priorytetowy inńynieria fotoniczna, Warszawa 2000	System analizy i rozpoznawania cyfrowych obrazów mikroskopowych, pp. 109- 115
[Pub184]	J. Krupka,, A P Gregory, O C Rochard, R N Clarke, B Riddle and J Baker_Jarvis	International Conference on Microwave Materials and Thair Applications-MMA2000, Bled, Slovenia, Aug. 30	Uncertainty of Complex Permittivity Measurments by Split-Post Dielectric Resonator Technique, p. 57

7. RESEARCH REPORTS

[Rep1] T.M Adamowicz, **High beam quality UV lasers for microelectronics** (Opracowanie ultrafioletowych laserów generujńcych wysokiej jakońci wińzki promieniowania dla zastosowań w mikroelektronice), 01.11.1999-30.04.2000, II-d semi-annual report

[Rep2] T.M. Adamiowicz, **High beam quality UV lasers for microelectronics** (Opracowanie ultrafioletowych laserów generujńcych wysokiej jakońci wińzki promieniowania dla zastosowań w mikroelektronice), 1.05.2000-31.10.2000, III-d semi-annual report

[Rep3] Piotr Szwemin, **Application of Monte-Carlo method in precision calculation of vacuum metrological systems properietes,** (Zastoso wanie metody Monte-Carlo do precyzyjnych obliczeń w układach metrologicznych)

[Rep4] Wiesław Kuźmicz, **Development of Internet-based CAD tools** (Rozwój narzńdzi wspomagania projektowania wykorzystujńcych internet)

[Rep5] Bogdan Galwas, **Elaboration and Realization of Sub-assemblies for Radio-optical Link** (Opracowanie koncepcji i wykonanie elementów łńcza radiowo-optycznego),

[Rep6] Piotr Szwemin, **Implementation of 5 new Random Number Generators into Moly Flow..er® software** (Implementacja 5 nowych generatorów liczb losowych do programu Moly Flow..er®)

[Rep7] Tadeusz Adamowicz, **Investigation of thermally evaporated hollow-cathode He-Zn lasers** (Badanie lasera wnńkowego He-Zn z ońrodkiem aktywnym wytwarzanym termicznie)

[Rep8] Ryszard Kisiel, **Lead-free solder and solder pastes for high temperature applications** (Luty i pasty bezołowiowe do pracy w podwyńszonych temperaturach)

[Rep9] Romuald B. Beck, **Putting into operation and calibrating techological process realized in new cleanliness standards** (Uruchomienie i przeskalowanie procesów technologicznych realizowanych w nowym standardzie czystońci)

[Rep10] Hanna Górkiewicz-Galwas, **Texture Analysis System** (System analizy tekstur)

[Rep11] Hanna Górkiewicz-Galwas, **Analysis of tree structures in medical images** (Analiza struktur drzewiastych w obrazach medycznych)

[Rep12] Zbigniew Szczepański, **Assembly Process for Silicon Structures with Gold and Solder Bumps** (Opracowanie technologii dołńczania struktur półprzewodnikowych z kontaktami podwyńszonymi)

[Rep13] Witold Pleskacz, **CMOS implementation of electronic circuits for spread spectrum communication based on chaos generators**, (Implementacja ukladow do lacznosci szerokopasmowej wykorzystujacych generatory drgan chaotycznych w technologii CMOS)

[Rep14] Jerzy Woźnicki, **Microscopic image analysis and recognition system** (System analizy i rozpoznawania cyfrowych obrazów mikroskopowych)

[Rep15] Andrzej Jakubowski, **Modeling of static characteristics and parameters of SiGe devices** (Modelowanie charakterystyk i parametrów przyrzńdów półprzewodnikowych z krzemogermanu)

[Rep16] Michał Malinowski, **Optical and laser properties of highly rare earth doped Re^{3+}:YAG/YAG planar waveguides (**Badanie włańciwońci optycznych i generacyjnych silnie domieszkowanych warstw ńwiatłowodowych RE^{3+}:YAG/YAG)

[Rep17] Jan Szmidt, **Technological conditions of plasma synthesis of silicon carbide (SiC) films on silicon (Si)** (Warunki technologiczne wytwarzania warstw wńglika krzemu (SiC) metodami plazmowymi na powierzchni krzemu (Si))

[Rep18] Bogdan Majkusiak, **The influence of MOS/SOI transistor channel dimensions on carriers mobility** (Wpływ rozmiarów kanału tranzystora polowego MOS/SOI na ruchliwońńnońników)

[Rep19] Romuald B. Beck, **Ultrathin silicon dioxide (SiO_2) and high – K dielectrics layers (manufacturing and chracterization)** (Uktracienkie warstwy dwutlenku krzemu (SiO_2) i dielektryków o wysokiej stałej dielektrycznej (wytwarzanie i charakteryzacja))

[Rep20] Jerzy Kruszewski, **Fibre optics amplifier's elaboration for 1.06mm laser range meter and for 1.53mm pumped by laser diodes PBZ-32-10, Task 4,** (Zadanie 4, pt: Opracowanie wzmacniaczy włóknowych na zakres 1.06mm dla dalmierza laserowego i na 1.53mm pobudzanych diodami laserowymi)

[Rep21] Jerzy K. Piotrowski, **Application Of A Coaxial Line - Waveguide Below Cut-Off Transition For Microwave Methods Of Dielectric Measurements** (Zastosowanie połńczenia linia współosiowa - podkrytyczny falowod kołowy w mikrofalowych metodach pomiaru dielektryków)

[Rep22] Andrzej Jakubowski, **Charge pumping in SOI structures: modeling and parameter extraction** (Metoda pompowania ladunku w strukturach SOI: model i ekstrakcja parametrow)

[Rep23] Ryszard Kisiel,**The influence of polymer matrix and filer type on adhesive joints performances** (Badanie wpływu wybranych układów polimerów wiążących i napełniaczy na parametry użytkowe połącześ wykonywanych klejami elektrycznie przewodzącymi)

[Rep24] **Elaboration Of Fibre Optic Amplifiers At The Range 1060nm For Laser Range-Finder And At 1530nm Pumped By Laser Diodes** (Opracowanie wzmacniaczy włóknowych na zakres 1060 nm dla dalmierza laserowego i na 1530 nm pobudzanych diodami laserowymi), Warsaw University of Technology, Institute of Microelectronics and Optoelectronics, project leader: Wiesław Woliś ski,

[Rep25] **Researches On Metal Ion Lasers For Ultraviolet Laser Generation** (Badania laserów jonowych na parach metali dla generacji w obszarze nadfioletu), Warsaw University of Technology, Institute of Microelectronics and Optoelectronics, project leader: Tadeusz M. Adamowicz,

[Rep26] **Studies On Laser-Diode Excitation And Construction Of Planar Waveguide Nd:YAG/YAG Lasers** (Opracowanie metod wzbudzania, podzespołów i konstrukcji falowodowych laserów cienkowarstowych Nd:YAG/YAG pobudzanych diodami laserowymi), Warsaw University of Technology, Institute of Microelectronics and Optoelectronics, project leader: Michał Malinowski,

[Rep27] Mikołaj Baszun, **Analysis of Delay Lines with Interdigital Transducers for Liquid Sensors Applications** (Analiza linii opóśniających z przetwornikami miśdzypalczastymi do zastosowaś czujnikowych w cieczach)

[Rep28] Bogdan Galwas, **Modulation And Controlling Of Microwave Cuircuits By Means Of Optical Radiation** (Badania metod modulacji i sterowania układami mikrofalowymi z wykorzystaniem promieniowania optycznego)

[Rep29] Jerzy Krupka, **The Elaboration Of Design Methods And Realisation Of New Microwave Filters With Dielectric Resonators For Telecommunication And Cellular Telephony** (Opracowanie metod projektowania i wykonanie nowych typów filtrów mikrofalowych z rezonatorami dielektrycznymi dla telekomunikacji i telefonii komórkowej)

[Rep30] Krzysztof Domaś ski, **Applications of porous silicon for fabrication of micromechanical sensors silicon components** (Zastosowania porowatego krzemu do wytwarzania krzemowych elementów czujników mikromechanicznych)

8. PATENTS

[Pat1] J.Kśsik, P.Warda, W.Woliś ski **The ion gas laser discharge tube** (Rura wyladowcza jonowego lasera gazowego) (patent: PL 179212 B1; notified: 27.10.1997 BUP 22/97; provided: 31.08.2000 WUP 00/00), Prime Minister Prize for remarkable technical and science national achievement (‘2000)

[Pat1] M.Grygolec, M.Niewczas, **The circuit for weighted mean evaluation especially suitable for the defuzzyfication** (Układ wyznaczający średnią ważoną, zwłaszcza do deffuzyfikacji), (patent: P316298, notified: 26.09.1996, provided: 30.08.2000)

9. CONFERENCES, SEMINARS AND MEETINGS

9.1. International Conferences

[Con1] **1st Annual International IEEE-EMBS Special Topic Conference on Microtechnologies in Medicine & Biology,** Lyon, France, October 12-14, 2000
reporters: Z. Jaworski, W. Kuźmicz, M. Sadowski, D. Sarna, A. Wałkanis, A. Wielgus, A. Wojtasik

[Con2] **1st International Symposium on Microgravity Research and Application in Physical Science and Biotechnology,** Sorento, Italy, September 9-16, 2000
reporter: M. Baszun

[Con3] **1st International Symposium on Quality Electronic Design IEEE 2000,** San Jose, California, USA, 20-22 March 2000
speaker: W. Kuźmicz

[Con4] **3rd Polish French Symposium,** Warsaw, Poland**,** May 18-19, 2000
speaker: P.J.Szwemin

[Con5] **4th International Conference on Adhesive Joining & Coating Technology in Electronics Manufacturing,** Helsinki, Finland, June 8-21, 2000
speaker: R.Kisiel

[Con6] **4th International Symposium on Microelectronic Technologies and Microsystems,** Zwickau, Germany, October 26-27, 2000
speaker: Z.Szczepański

[Con7] **5th Symposium „Diagnostics and Yield – Advanced Silicon Devices and Technologies for ULSI Era" D&Y'2000,** Warsaw, Poland, June 28-30, 2000
speakers: R.B. Beck, A. Jakubowski, L. Łukasiak, M. Jurczak, J. Szmidt, A. Werbowy,
reporters: A. Zarńba, A. Jakubowski, S. Szostak, L. Łukasiak, J. Szmidt, A. Werbowy, E. Dusiński, M.T.Htun Aung, M. Sochacki, J. Gibki, K. Domański, T. Dńbski, J. Ruńyłło, R.B. Beck, T. Janik, B. Majkusiak, S.M. Pietruszko, M. Kostana,
chairman: A. Jakubowski,
co-chairmans: R.B. Beck, L. Łukasiak,
co-organizers: J. Szmidt, B. Majkusiak, A. Werbowy

[Con8] **6th IEEE International Workshop on Cellular Neural Networks and their Applicatons (CNNA 2000),** Catania, Italy, May 23-25, 2000
speakers: A. Wielgus, W.A. Pleskacz, M. Wińniewski

[Con9] **7th International Conference Mixed Design of Integrated Circuits and Systems MIXDES 2000,** Gdynia, Poland, June 15-16, 2000
speakers: M. Wińniewski, A. Wielgus, W.A. Pleskacz, W. Kuźmicz, A. Wałkanis, M. Sadowski, A Wojtasik, Z. Jaworski
reporter: J. Pogorzelska
co-organizers & chairmans: W. Kuźmicz, A. Pfitzner

[Con10] **11th European ConferenceOn Diamond, Diamond-Like Materials, Carbon Nanotubes, Nitrides and Silicon Carbide,** Porto, Portugal, September 3-8, 2000
reporter: A. Werbowy

[Con11] **13th International Conference on Microwaves, Radar & Wireless Communications MIKON'2000,** Wrocław, Poland, May 22-25, 2000
speaker: J. Krupka,
reporters: J. Dawidczyk, B. Galwas, Z. Szczepaniak, J. K. Piotrowski, J. Krupka,
co-organizer: B. Galwas,
chairman: B. Galwas

[Con12] **16th European Photovoltaic Conference and Exhibition,** Glasgow, U.K., May 1-5, 2000
speaker & reporter & chairman: S. M. Pietruszko

[Con13] **18th NORCHIP Conference 2000,** Turku, Finland, November 6-7, 2000
speaker: Z. Jaworski

[Con14] **28th IEEE PV Specialists Conference,** Anchorage, USA, September 16 –25, 2000
reporters: S.M. Pietruszko, A. Warszawik,
chairman: S.M. Pietruszko

[Con15] **30th European Solid State Device Research Conference ESSDERC'2000,** Cork, Ireland, September 11-13, 2000
speaker: M. Jurczak,
co-organizer: M. Jurczak

[Con16] **30thEuropean Microwave Conference,** Paris, France**,** September 30 – October 5, 2000
reporter: J. Piotrowski

[Con17] **Conference ISSE 2000, 23rd International Spring Seminar on Electronics Technology,** Balatonfured, Hungary, May 6-10, 2000
speaker: R.Kisiel

[Con18] **Conference on Laser and Electro-Optics Europe (CLEO 2000),** Nice, France, September 10-15, 2000
reporters: T.Kossek, P.Szczepański

[Con19] **Conference on Modern Problems of Telecommunications, Computer Science and Engineers Training,** Lvov-Slavsko, Ukraine, February 14-19, 2000
speakers: W. Pleskacz, W. Kuźmicz, J. Laskowski, A. Pfitzner

[Con20] **ENERGEX,** Las Vegas, USA, July 23-28, 2000
co-organizer: S.M. Pietruszko

[Con21] **European Materials Research Society 2000 Spring Meeting,** Strasbourg, France, May 30-June 2, 2000
reporter: J. Szmidt

[Con22] **European Meeting on Silicon on Insulator Devices EUROSOI-2000,** Granada, Spain, October 25-27, 2000
speaker: B. Majkusiak,
chairman: B. Majkusiak

[Con23] **European Research "Photovoltaic Devices",** Berlin, Germany, March 31 – April 05, 2000
chairman: S.M. Pietruszko

[Con24] **ICMS'2000, XV International Conference on Microwave Ferrites, Rokosowo**, Poland, September 4-7,.2000
speaker: J. Krupka

[Con25] **IEEE European Test Workshop,** Cascais, Portugal, May 23-26, 2000
speakers: W. Kuźmicz, W. Pleskacz

[Con26] **IEEE Workshop on Nonlinear Dynamics of Electronic Systems,** Catania, Italy, May 18-20, 2000
reporters: M. Grygolec, W. Pleskacz

[Con27] **International Conference GAAS'2000,** Paris, France, October 2-3, 2000
reporter: J. Piotrowski

[Con28] **International Conference on f-Elements, ICFE'4,** Madrid, Spain, September 17-21, 2000
speaker: M. Malinowski,
reporter: M. Kaczkan

[Con29] **International Conference on Solid State Crystals Materials Science and Applications,** Zakopane, Poland, October 9-13, 2000
reporter: M. Malinowski

[Con30] **International Conference Innovative / Cost-Effective Materials Processing Methods – Films & Nanocrystalline Powders,** London, U.K., July 6-7, 2000
reporter: J. Szmidt

[Con31] **International Conference on Microwave Materials and Their Applications – MMA 2000,** Bled, Slovenia, August 30 – September 2, 2000
speaker: J. Krupka

[Con32] **International Symposium on Contemporary Computing in Ukraine – CCU'2000,** Lvov, Ukraine, February 21 – 25, 2000
speakers: W. Kuźmicz, W. Pleskacz

[Con33] **ISES – EUROSUN,** Copenhagen, Holland, June 18-22, 2000
audience: S.M. Pietruszko,
co-organizer & chairman: S.M. Pietruszko

[Con34] **Materialove Inzenyrostvi - Nove Materialy a Technologie,** Liberec, Czech Republic, June 5-9, 2000
speakers: J. Szmidt, A. Werbowy
co-organizer: J. Szmidt,
chairman: J. Szmidt

[Con35] **Montreux Jazz Festival and 5th Biennial Conference on Engineering Systems Design & Analysis,** Montreux, Switzerland, July 10-13, 2000
speaker: M. Baszun

[Con36] **Symposium IMAPS EUROPE PRAGUE 2000, European 8 Microelectronics Packaging and Interconnection Symposium With Table Top Exhibition,** Prague,Czech Republic, June 18-20, 2000
reporter: R.Kisiel

[Con37] **Symposium on VLSI Technology,** Honolulu, Hawaii, June 12-15, 2000
speaker: M. Jurczak

[Con38] **V International Conference Material Science and Material Properties for Infrared Optoelectronics,** Kyiv, Ukraine, May 22-24, 2000
speaker: M. Malinowski

[Con39] **Workshop Microtechnology and Thermal Problems in Electronics – MICROTHERM 2000,** Łódź – Zakopane, September 27– October 3, 2000
speaker: J. Szmidt
reporters: A. Jakubowski, L Łukasiak,
co-organizer: J. Szmidt,
chairmans: J. Szmidt, B.Majkusiak

[Con40] **Workshop on Polymeric Materials for Microelectronics and Photonics Applications: Mechanics, Physics, Reliability, Processing 2000,** London, UK, December 4-5, 2000
speaker: R.Kisiel

[Con41] **WS6 Workshop on Vacuum Metrology,** Avila, July 17-19, 2000
reporter: P.J.Szwemin

[Con42] **XVth ESCAMPING Europhysics Conference on Atomic and Molecular Physics of Ionized Gases,** Lilafured, Miskolc, Hungary, August 26-30, 2000
reporters: T.M.Adamowicz, W. Kamiński

[Con43] **XXIV International Conference IMAPS POLAND 2000,** Rytro, Poland, September 25-29, 2000
speakers: Z. Szczepański, K. Kisiel,
reporter: K.Kisiel,
co-organizers: Z. Szczepański, K. Kisiel

[Con44] **World Renewable Energy Congress,** Brighton, UK, July 1-7, 2000
co-organizer: S.M. Pietruszko

9.2. Local Conferences

[Con45] **17th Symposium on Hydroacoustics,** Jurata, May 22-26, 2000
speaker: M. Baszun

[Con46] **Konferencja "Wave Methods and Mechanics in Biomedical Engineering",** Cracov, April 5-7, 2000
reporter: M. Baszun

[Con47] **Konferencja „Biznes dla Środowiska",** Poznań, May 11-12, 2000
Speaker & chairman: S.M. Pietruszko

[Con48] **Konferencja „Ludzie, przyroda, kultura – krajobraz czynnikiem rozwoju Polski",** Warsaw, November 10, 2000
audience: S.M. Pietruszko

[Con49] **Konferencja Naukowa Czujniki Optoelektroniczne i elektroniczne, COE 2000,** Gliwice, June 13-16, 2000
reporters: M. Borecki, J. Kruszewski, M. Bebłowska, K. Kopczyński

[Con50] **Modelowanie i symulacja, Zakopane,** June 19-20, 2000
speaker: M. Baszun

[Con51] **VI Forum Odnawialnych Źródeł Energii**, Łódź, December 4-6, 2000
speakers: S.M. Pietruszko, A. Warszawik,
co-organizer & chairman: S.M. Pietruszko

[Con52] **VII Konferencja Naukowa „Technologia Elektronowa" ELTE 2000,** Polanica Zdrój, September 18-22, 2000
speakers: L. Łukasiak, A. Jakubowski, B. Majkusiak, J. Szmidt, W. Kuźmicz
reporters: K. Domański, A. Wojtkiewicz, R.B. Beck, J. Szmidt, A. Werbowy, M. Sochacki, L. Łukasiak, A. Jakubowski, S. Szostak, J. Gibki, J. Walczak, B. Majkusiak, A. Zarźba, J. Dawidczyk, Z. R. Szczepaniak, J.Kźsik, P.Warda, T.M. Adamowicz, W.Kamiński, P.Szczepański, T.Kossek, M.Malinowski, P. Szwemin, M. Niewiński, J.Pogorzelska, M. Kostana, S. M. Pietruszko, E. Piwowarska, W. Pleskacz, T. Oleszczak, D. Kasprowicz, W. Kuźmicz, M. Sadowski, A. Pfitzner, A. Lejman, J. Laskowski,
chairman: A. Jakubowski, A. Pfitzner,
co-organizers: A. Jakubowski, P.Szwemin, W. Kuźmicz, A. Pfitzner

9.3. Schools and Seminars

[Con53] **3rd International Summer School on Interaction between Microwaves and Optics,** Autrans, France, August 28 – September 1, 2000
reporters: J. Dawidczyk, Z. Szczepaniak

[Con54] **10** Moscow, Russia, o uo o o o o o o , o o o o
speaker: B. Galwas

[Con55] **14th School of Optoelectronics Polish Academy of Sciences,** Stare Jabłonki, Poland, November 7-11, 2000
reporters: M.Borecki, J. Kruszewski

[Con56] **Institute Seminar:** „Jak kształcić nowocześnie inżynierów elektroników?", June 9, 2000
speaker: E.Piwowarska,
audience: P.Szwemin, J.Pfitzner, A.Jakubowski

[Con57] **Institute Seminar:** „Large area imaging using amorphous silicon technology", May 12, 2000
speaker: A.Nathan,
audience: R.Beck, M.Jurczak, A.Jakubowski, P.Szwemin

[Con58] **Institute Seminar:** „Metody optycznej synchronizacji i modulacji czźstotliwoźci oscylatorów mikrofalowych", October 26, 2000
speaker: Z.Szczepaniak,
audience: P.Witoźski, B.Galwas, J.Skulski, A.Jakubowski, J.Dawidczyk, A.Pfitzner, P.Szwemin

[Con59] **Institute Seminar:** „Modele lateralnych tranzystorów bipolarnych o arbitralnej geometrii w układach CMOS", October 5, 2000
speaker: M.Grygolec,
audience: A.Jakubowski, A.Jarosz, W.Pleskacz, W.Kuźmicz, M.Sadowski, E.Piwowarska, A.Wielgus, A.Pfitzner, Z.Jaworski, A.Wojtasik, G.Janczyk, P.Szwemin

[Con60] **Institute Seminar:** „Modelowanie tranzystora MOS dla potrzeb symulacji statycznej", September 14, 2000
speaker: J.Laskowski,
audience: A.Jakubowski, M.Jurczak, L.Łukasiak, R.Beck

[Con61] **Institute Seminar:** „Synteza i symulacja struktur układów scalonych VLSI implementujących funkcje logiki rozmytej", November 16, 2000
speaker: A.Wielgus,
audience: A.Jakubowski, M.Sadowski, M.Grygolec, P.Szwemin, E.Piwowarska, W.Pleskacz, P.Firek, J.Laskowski, A.Pfitzner

[Con62] **Institute Seminar:** „Termicznie indukowana metastabilnońńkrzemu amofricznego", May 11, 2000
speaker: M.Kostana,
audience: R.Beck, M.Jurczak, A.Jakubowski

[Con63] **Institute Seminar:** „Współczesne generatory liczb losowych", January 13, 2000
speaker: R.Wieczorkowski,
audience: W.Pleskacz, J.Laskowski, M.Niewiński, P.Szwemin, R.Kisiel, K.Szymański

[Con64] **Institute Seminar:** „Zjawisko lawinowe w materiałach laserowych domieszkowanych holmem", June 8, 2000
speaker: A.Wnuk,
audience: M.Malinowski, R.Piramidowicz, M.Kowalska, M.Szuflińska, M.Kaczkan

[Con65] **POLAGRA'2000, Seminar: Odnawialne Źródła Energii,** Poznań, Poland, October 7, 2000
speaker & chairman: S.M. Pietruszko

[Con66] **School: Synthesis for digital circuits - methods, algorithms, tools,** Warsaw, Poland, February 22-25, 2000
speakers: W. Pleskacz, E.Piwowarska, Z.Jaworski, A.Wielgus,
organizers: J. Gempel, St. Jeszka

[Con67] **Seminar in acustics,** Polańczyk, Poland, September 18-22, 2000
reporter: M. Baszun

[Con68] **Seminar: Optymalizacja wykorzystania zasobów energetycznych celem ochrony klimatu w Polsce,** Warsaw, Poland, September 8, 2000
audience: S.M. Pietruszko

[Con69] **Seminar: Scenariusze rozwoju energetyki odnawialnej w Polsce do roku 2020 na podstawie modelu SAFIRE,** Warsaw, Poland, December 3, 2000
audience: S.M. Pietruszko

[Con70] **Winter School on Molecular Acustics,** Ustroń, Poland, February 28 – March 4, 2000
reporter: M. Baszun

10.PRIZES

[Prize1] M.Jurczak, **Best Paper Award on 30th European Solid-State Device Research Conference – ESSDERC'2000**, ("Dielectric pockets – a new concept of the junction for deca-nanometics CMOS devices", M. Jurczak, T. Skotnicki, S. Monfray, et.al., pp. 536-539)

[Prize2] B.Galwas, **Second Degree Rector Award for Didactic 2000**

[Prize3] J.Kńsik, P.Warda, W.Woliński, **Prime Minister Prize for Remarkable Technical And Science National Achievement 2000** (patent PL 179212 B1: The ion gas laser discharge tube)

[Prize4] J.Krupka, **Best Paper Award in Journal: Measurements, Science and Technology,** ("Complex permityvity of some ultralow loss dielectric crystals at cryogenic temperatures", Measurements, Science and Technology, vol. 10, 387-392, 1999), January 2000

[Prize5] J.Krupka, **First Degree Rector Award for Scientific Achievement 2000**

[Prize6] S.Okoniewski, **Medal of National Education Board 2000**

[Prize7] G.Pastuszak, D.Kasprowicz (advisors W.Kuńmicz and W.Pleskacz), **Scholarship from Minister of National Education 2000**

[Prize8] A.Pfitzner, **First Degree Rector Award for Scientific Achievement 2000**

[Prize9] W.Pleskacz, **"Golden Chalk" - Student Council of the Faculty Teaching Award 2000**

[Prize10] A.Werbowy, **Second Degree Rector Award for Scientific Achievement 2000**

[Prize11] W.Woliński, **Prize for Remarkable Contribution In Development Of Polish Optoelectronics And Optotelecommunication on World Telecommunication Day 2000**