MICRO AND NANOTECHNOLOGIES BULLETIN

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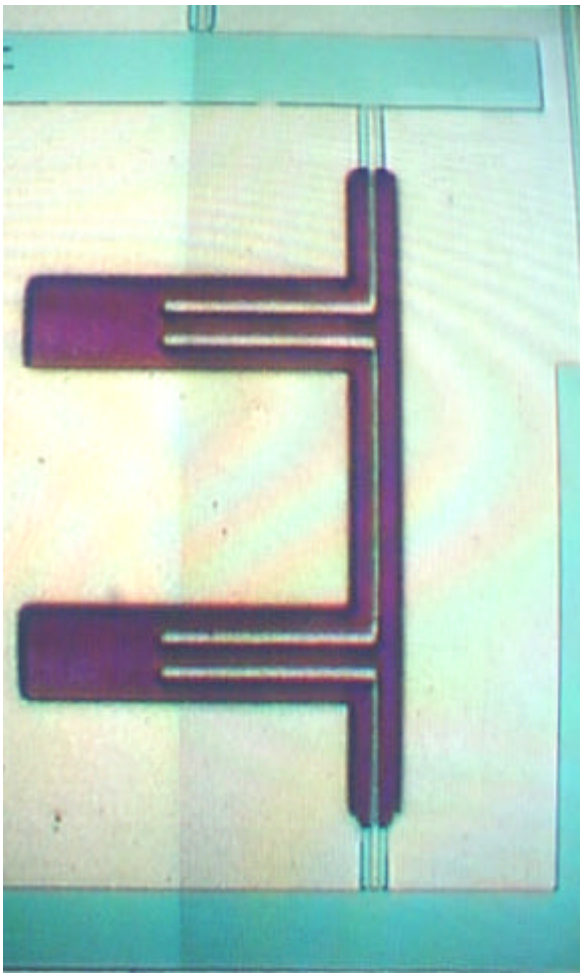

Photo: 38GHz filter structure manufactured on $SiO_2/Si_3N_4/SiO_2$ membrane on silicon substrate.
The miniaturized device was designed, manufactured and measured by IMT-Bucharest, IRST Trento , CNR Rome, Univ. Tor Vergata Rome and ICRCOM Limoges (MEMSWAVE European Project).

Why "micro and nanoscience and engineering"?

Nanoscience and technology *are related to physical structures with features in the range of nanometres and the corresponding specific phenomena. In a broad definition, nanotechnology includes all technology associated with either the "top-down" approach of sculpting the desired structure from a macroscopic piece of material, or the "bottom-up" approach of building a nanostructure atom by atom and molecule by molecule. The* ***nanostructured materials*** *have a huge potential. They allow creation of completely new materials with desired properties.*

Microtechnologies *are structuring the macroscopic materials at the micrometer level. Apart from the microelectronic technology, which is dedicated to fabricate complex electronic circuits constructed from electron devices performing their role in manipulating the electrical signal, micro technologies in general are able to fabricate* ***physical structures, which are activated by various forms of energy****. Microsensors and microactuators are typical examples. But complete systems interacting with the external world can be also fabricated. This corresponds to "integration" in one component of various components performing completely different tasks, e.g. micro-opto-electrical-mechanical systems (MOEMS). Clearly, a unique design process is necessary and the electrical, optical and mechanical engineering cannot longer be performed separately.*

The ***microsystems*** *do* ***not*** *represent a* ***miniaturised version*** *of the larger systems. By scaling down the conventional systems, the phenomena are different and the system must be re-engineered or constructed on a completely different principles.*

A complete new philosophy is brought down by the ***biological world****. Some materials, structures and (sub)systems are now* ***inspired from the living organisms****. The technical systems may become much more efficient in this way. We have also to consider* ***completely new methods of fabrication and maintenance*** *(also inspired from living organisms) such as self-assembly, auto-organisation and self-repair.*

Main topics:

• Scientific events preparing the development of the ROMINFOR association
• Specific activities related to CAS 2000

Edited by
National Institute for Research and Development in Microtechnologies,
IMT Bucharest, **www.imt.ro**

ROMINFOR - Micro and nanoscience and technology

A new section of the Romanian Association for Research in IT & Communications (ROMINFOR) was established on November 1st: "Micro and nanoscience and technology". The founders are Romanian research institutes and universities from Bucharest, Iasi, Cluj, Timisoara, Rm.Valcea and Targoviste.

The main goals of this section are: to promote the field among the priorities of the Romanian scientifical research and technological development, to facilitate competitive multidisciplinary researches and to build research networks at national level and to participate in the international research networks with the purpose to build stategic partnerships with USA and European Union countries.

The first short term action of the section is already accomplished by editing this pilot number. Soon, a White Book of the field will be elaborated. As medium and long term actions, a series of volumes wiil be edited, scientific and educational meetings will be organized and co-operation links with foreign professional associations will be established.

Founder Members of the section "Micro and nanoscience and technology" of ROMINFOR:
National Institute for Reasearch and Development in Microtechnologies Bucharest, National Institute for Research and Development in Materials Physics Bucharest, National Institute for Research and Development in Lasers, Plasma and Radiations Bucharest, Research Centre for Macromolecular Materials and Membranes Bucharest, National Centre for Consulting in Environment Protection Bucharest, Research Centre in Theoretical and Applied Phyisical Chemistry Bucharest, Institute of Biology, Institute for Physical Chemistry, National Institute for Research and Development in Technical Physics Iasi, Institute for Macromolecular Chemistry Iasi, National Institute for Research and Development for Molecular Technology Cluj, Institute for Researches in Condensed Matter Timisoara, National Institute for Research and Development for Cryogenic and Isotopic Technologies Rm. Valcea, Institute for Research University Politechnica Bucharest, University Bucharest, University Valahia Targoviste.

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Scientific seminars organized by the National Agency for Science, Technology and Innovation (ANSTI), and the Romanian Academy (Commission for Science and Technology of Microsystems)

MICRO- AND NANOSTRUCTURES POSSIBILITIES AND PERSPECTIVES

Aula Magna of the Romanian Academy, February 4th, 2000
Introductory speeches by the Vice-president of the Romanian Academy and the President of ANSTI (see the next pages)

MICROSYSTEMS, MICROSTRUCTURES AND NANOSTRUCTURES SCIENCE AND TECHNOLOGY *Acad. Dan Dascalu, General Manager of the National Institute for Research and Development in Microtechnologies - IMT-Bucharest*

BIOLOGICAL APPLICATIONS OF MICROSTRUCTURES *Prof. Dr. Victor A. Voicu c.m. of the Romanian Academy, Manager of the Centre for Medical Military Scientific Researches*

POSSIBILITIES AND PERSPECTIVES OF MATERIALS PHYSICS WITHIN THE MICRO- AND NANOTECHNOLOGY PROGRAMME *Dr. Florin Vasiliu, Scientific Manager of the National Institute for Research and Development in Materials Physics, Bucharest*

NANOSTRUCTURAL MATERIALS AND MAGNETIC MICRODEVICES *Prof. Dr. Horia Chiriac, General Manager of the National Institute for Research and Development in Technical Physics - Iasi*

NANOPHASE MATERIALS WITH INDUSTRIAL AND ECOLOGIC UTILISATIONS *Prof. Dr. Eng. Eugen Pincovschi Politehnica University - Bucharest, Faculty of Industrial Chemistry*

MICRO- AND NANOSTRUCTURED FLUID SYSTEMS WITH UTILISATION IN THE PHARMACEUTICAL AND COSMETIC FIELD *Prof. Dr. Mihaela Olteanu, University of Bucharest, Faculty of Chemistry*

MICRO- AND NANOSTRUCTURES II

General Association of Romanian Engineers (AGIR), February 18th, 2000

REPORT ON THE PREPARATION OF THE "MICRO- AND NANOTECHNOLOGIES" PROGRAMME *Acad. Dan Dascalu, General Manager of the National Institute for Research and Development in Microtechnologies - IMT-Bucharest*

MICROPROCESSING TECHNOLOGIES OF SNO2 THIN FILMS BASED GAS SENSORS *Cornel Cobianu (IMT-Bucharest) et al.*

ELECTRICAL AND OPTIC PROPERTIES OF HETEROCYCLIC CONDUCTING POLYMERS WITH APPLICABILITY IN THE FIELD OF CHEMICAL SENSORS *R. Turcu (National Institute for Research and Development in Isotopic and Molecular Technologies, Cluj-Napoca) et al.*

THIN FILMS OF CONJUGATED POLYMERS OBTAINED THROUGH THE REACTIVE VAPOUR DEPOSITION METHOD: AZO-POLYMERS RESULTED FROM AROMATIC DIAZINES *Virgil Barboiu (Institute of Macromolecular Chemistry "Petru Poni", Iasi) et al.*

NANOSTRUCTURES OBTAINED THROUGH SILICON MICROPROCESSING *Irina Kleps (IMT-Bucharest) et al.*

POROUS Al_2O_3 AND CARBON NANOSTRUCTURES *G. Mihailescu (National Institute for Research and Development in Isotropic and Molecular Technologies, Cluj-Napoca) et al.*

EXAMPLES OF LASER AND PLASMA OBTAINED MICROSTRUCTURES AND NANO- AND MICROSTRUCTURES MATERIALS *G. Dinescu and I. Morjan (National Institute of Laser, Plasma and Radiation Physics)*

MICROACTUATORS AND ELECTROMECHANICAL MICROACTUATION *Mircea Ignat (ICPE-Bucharest)*

GENETIC ALGORITHMS FOR OPTIMIZATION MATTERS *Alexandru Agapie (National Institute for Research and Development in Microtechnologies, IMT-Bucharest) et al.*

POTENTIAL APPLICATIONS OF MICRO- AND NANOSTRUCTURES FOR IMPROVING LIFE QUALITY *Prof. Dr. Tatiana Oncescu (University of Bucharest, Faculty of Chemistry, Physical Chemistry Department)*

MICROPHOTONIC DEVICES AND CIRCUITS FOR OPTO-ELECTRO-MECHANICAL MICROSYSTEMS *Dana Cristea (IMT-Bucharest) et al.*

MAGNETIC MOLECULAR MATERIALS *Prof. Dr. Marius Andruh (Faculty of Chemistry, University of Bucharest)*

MAGNETIC FLUIDS: PREPARATION METHODS, MICROSTRUCTURE, PROPERTIES AND APPLICATIONS IN TECHNIQUE AND BIOLOGY *Ladislau Vekas (Centre of Fundamental and Advanced Technical Researches - Laboratory of Magnetic Liquids, Timisoara Subsidiary of the Romanian Academy)*

NEW NANOSTRUCTURED MAGNETIC MATERIALS *Wilhelm Kappel (ICPE-Bucharest) et al.*

CARBONIC MICRO- AND NANOSTRUCTURES *Gabriela Hristea (ICPE-Bucharest) et al.*

SYNTHESIS HYDROCHEMICAL PROCESSES OF CERAMIC NANOMATERIALS WITH APPLICATIONS IN SENSORS - ACHIVEMENTS AND PERSPECTIVES *R.R. Piticescu (ICPE Bucharest) et al.*

The Scientific Seminar **"MICRO- AND NANOSTRUCTURES - POSSIBILITIES AND PERSPECTIVES"**

The oppening address of ACAD. MAYA SIMIONESCU - vicepresident of the Romanian Academy, Director of the Institute of Cellular Biology and Pathology

"Mr. President, Members of the Academy, Professors and Distinguished Guests,

The Romanian Academy is pleased to host the first conference on science and technology of micro - and nanostructures. It is an opportunity for specialists to share information and knowledge and, together with the researchers of other fields to estimate the possibilities and the perspectives of the new field, of "Nanosciences".

The intentions of this seminar are: (1) to present to the scientific community, an image and a critical overview on the development of nanosciences in our country and in the world; (2) to identify the promising areas for further developments in the field; (3) to figure out the interdisciplinary research programs in the field of nanostructures and (4) to stimulate the cooperation between the specialists from various fields.

The science of nanostructures has developed as a wide interdisciplinary research area, all over the world especially during the last years when scientists became aware that starting from atoms and the nanoparticles, they can structure materials with new functions and improved properties.

You will be listening to a large number of specialized papers.

I would like to refer to the domain I know a little better, namely on the promise held by nanomaterials for biomedicine.

I think that the medical applications of nanomaterials will revolutionize the medical sciences, just as 30 years ago, the new material science, revolutionized medicine by introducing the artificial valves, nylon arteries and artificial joints.

The research in Nanomedicine is moving close to the clinic. Here are a few examples: in USA the recent unsuccessful attempt of applying gene therapy to a 17 years old patient, has shocked the medical scientific community. The young patient had a very rare genetic defect, making his body unable to metabolize ammonium. He received a form of still experimental gene therapy by which small DNA fragments were introduced into the cells using viruses (as a Trojan Horse) to repair the absent or deficient genes. The viral particles were supposed to insert into the cells the correct DNA fragment, so that in the case of the young patient the liver should become able to process ammonium. However, the particularly powerful immune reaction resulted in the patient's death. The researchers in biomedicine have tried to find safe alternatives for the gene transport to the human cells. Thus nanotechnology has entered the stage.

The progress in physical sciences began to offer alternative solutions for gene therapy, cancer and diabetes treatment.

The scientists have begun to combine the knowledge in biology and chemistry with the synthesis and manufacturing of nano-instruments from the chemical engineering and even from microchip industry. They have learned to create tools and materials at a scale of a thousand millionth of a meter. In this way, structures and tools have been created that are not bigger than biomolecules such as the DNA. The advantage of nanostructures is that as non-biological substances they can be produced so as the immune response of the organism is abolished.

Professor James Backer of the University of Michigan has created a new type of polymer called dendrimer, a synthetic multibranch molecule to which using intermediary 'hooks' the DNA can be attached and may be inserted into target cells. A blast of further studies has shown that dendrimers can be used in drug targeting, gene therapy and even in the medical imagery analysis. At present, intense experimental researches are being performed on animal models that have good chances to be extended to the clinic in the future.

In addition, the dendrimers have been used to create "intelligent bombs" for cancer therapy. They have been designed to detect premalignant or malignant cellular modifications and upon sensing them to release a substance capable of killing the alterred cells. Moreover, they will be conceived in such a way so as to be able to check whether the alterred cell has been or not destroyed.

Researchers in biomedicine have never been able to actually "play" with these nanoparticles; therefore they imported techniques and expertise form other domains.

The idea of silicon chips, of only a few hundred nanometers was successfully used experimentally by Mauro Ferrari at the Ohio University. He used silicon nanopackages in which he placed healthy cells to replace the function of affected cells. For instance he encapsulated insulin-producing cells to replace the altered function of pancreatic cells of a diabetic. The packages containing healthy cells can be implanted under the patient's skin. To avoid the immune reaction Ferrari manufactured silicon capsules outfitted with a membrane with pores at nanometric dimension, sufficiently small so as to avoid antibodies to enter, and large enough for the molecules synthesized by encapsulated cells to get out. One of his collaborators, Tejal Desai, is trying to use the same method, to replace the function of the brain cells affected by Parkinson and Alzheimer disease. The experimental results are encouraging.

In our institute (Institute of Cellular Biology and Pathology), attempts have been made to use unilamellar liposomes for targeting drugs specifically to altered cells. We are trying to incorporate an anti-atherosclerosis or an anti-diabetic drug within liposomes that are provided on their surface with an antibody that recognizes specific molecules (antigens) present only on altered cell membranes. It is a small step but the perspectives are great. These are only very few examples of the impact of nanotechnology in medicine.

Prospects are ample in all fields and the basic concept is to use the performances of nanostructures for the benefit of mankind.

Thank you for your attention.

The Address of **PROF. DR. ENG. LANYI SZABOLCS,** President of ANSTI, at the Seminar **"MICRO- AND NANOSTRUCTURES"**

Aula Magna of the Romanian Academy, Friday, February 4th, 2000

"Dear vice-president of the Romanian Academy, dear members of the Academy, dear researchers, Dear Sirs,

I do not want to deliver a lecture, but to transmit only a few thoughts which have put a mark on us at the moment we have decided that today, here, in the sanctuary of the Romanian science, in the Assembly Hall of the Romanian Academy, we should initiate a scientific seminar, suggested by the promoters as a landmark between yesterday's and today's science.

If it is mentioned intuition is or is not materialized, if we succeed or do not succeed in opening the gate towards the science of the third millenium, this lies to the account of the future generation's confirmation, but our declared intention is the proof of our will released to this effect.

I took the liberty of mentioning the third millenium to urge you to take a look, together, at the future.

I think, it is really a challenge, to forget about our present-day difficult problems, and dare together project us in the future. But I wonder: who is more entitled to take this leap towards in the future, if indeed the servant of science and I refer here to our academic community. Who must and can have the power of coming off the daily life clenching, the goals of the society.

The scientific research system structuring is one of measures belonging to the reform politics in science, resulting in the reorientation of part of researchers in the sense of their subordination to major objectives. Actually, I have expressed here the necessity of coagulating the researchers around some objectives, defining in fact their inter- and multidisciplinarity. In other words, with your permission, from the above I would have liked to demonstrate a theorem that inter- and multidisciplinary research, as a way to making the research activity efficient, is a present political objective.

Why micro- and nanostructure? Matter micro- and nanostructure and the technologies of obtaining micro- and nanostructure equipment represent not only the domain of the future but also a domain where various branches of science join in the most spectacular way, a domain connecting physics with biology, biology with mathematics, with chemistry, with physics and all together. The resultant of this combination is not only a new science, already called nanoscience, but it also is a new concept about materials and technologies, actually a new philosophy, in the sense of going beyond conventionalism towards another world which we do not know to accurately define it today.

What can be more unconventional than a micromotor started up by the induced motion of bacteria scourge?!… It is difficult to imagine how far this science may develop.

We thank you for your presence and for the help we expect from you, so that through the presentations we submit to your attention and through discussions we may define together our possible contribution, that of the Romanian future research to micro- and nanostructure science and technology for the third millenium.

I am convinced that I needn't wish every success to this symposium, because your presence is a pledge of success." Thank you (applause).

Romanian Academy

Workshop:

"TOWARDS A NATIONAL PROGRAMME OF RESEARCH AND DEVELOPMENT IN MICRO AND NANOTECHNOLOGIES"

June 26th 2000, University "Politehnica" Bucharest

Part I

Measures taken by the Consultative Board of ANSTI for defining priority issues and the PNCDI (National Research - Development and Innovation Plan) **extension with new programs.**

- Prof. Dr. Eng. Ion Dumitrache, Rector of the University "Politehnica" Bucharest, introductory address.

- Acad. Dan Dascalu, co-ordinator of the working group for the "Micro- and Nanotechnologies" program.

- Prof. Dr. Eng. Ecaterina Andronescu, Dean of the Faculty of Industrial Chemistry, University "Politehnica" Bucharest.

- Dr. Florin Vasiliu, scientific deputy director of INCD Materials Physics.

An international dimension of the "micro- and nanotechnologies" program. Access to technology and attractivity of the Romanian offer in international co-operation.

- Prof. Dr. Eng. Adrian Rusu, c.m. of the Romanian Academy "The IMPACT project and access to technological facilities in Western Europe".

- Dr. Al. Muller (IMT-Bucharest) "The MEMSWAVE project as an example of the East-West co-operation in high technology".

- Dr. eng. Rares Medianu, general manager of INCD - Lasers, Plasma and Radiations Physics - "The COST program of nanostructured materials".

- Dr. Ladislau Vekas "Informing report regarding the meeting of the COST Consultative Group For Nanosciences - Nanotechnologies (NanoSTAG)", May, 2000.

- Eng. Carmen Moldovan, head of laboratory within IMT-Bucharest, "Evolution of the NEXUS excellence network (User-Supplier Clubs)".

- Acad. Dan Dascalu "The micro-nano issues in PC 5 and anticipation of future developments. European area of research and innovation.

Part II

Towards a new co-operation type within the new program: the resources in Romania must go beyond a critical mass and attract a substantial funding from various sources.

- acad. Dan Dascalu: Set of proposals (the white book of micro- and nanotechnologies, interactive databases, laboratory networks, training of human, association of research groups etc.)

Debate of proposals"

Evolution in the year 2000 of the micro- and nanotechnologies multidisciplinary issues in the "Orizont 2000" program.

Informing report as concerns the start of researches in the pluridisciplinary objective "New materials and microsystems for life and environment quality".

Launch of competition for the objective "Micro- and nanotechnologies for a competitive and lasting development"

- Presentation delivered on the part of the "micro- and nanotechnologies" commission (dr. eng. Nicolae Varachiu, scientific secretary of the "micro- and nanotechnologies" commission).

- Presentation delivered on the part of the Consortium that has won the competition for the first objective (dr. eng Marius Bazu, head of department in IMT-Bucharest).

- Offer of INCD - Material Physics for the new programme (scientific microsession):

"SEMICONDUCTOR QUANTIC STRUCTURES AND APPLICATIONS", Dr. M. Lepsa; "ELECTRICAL AND LUMINESCENT PROPERTIES OF POROUS SILICON NANOCRYSTALLINE FILMS. ACHIEVEMENTS IN INCDFM", Dr. M. L. Ciurea, M. Draghici, M. Lazar; "NEW PERFORMANT PIEZOCERAMIC MATERIALS WITH A NANOMETRIC STRUCTURE MEANT TO THE FABRICATION OF PIEZOELECTRIC MICROMOTORS AND FINE MOVEMENT PIEZOCERAMIC ACTUATORS", Dr. C. Miclea; "MAGNETIC AND STRUCTURAL PROPERTIES OF ND2FE14B/ALPHA-FE NANOCOMPOSITE MAGNETS"; Dr. M. Valeanu, Dr. C. Bunescu, Dr. A. Jianu, Dr. D. P.Lazar - INCDFM, Dr. Kappel, S. Alexandru - ICPE.

University "Politehnica" Bucharest

Prof. Dr. Eng. Ecaterina Andronescu, Dean of the Faculty of Industrial Chemistry, University "Politehnica" Bucharest presenting an invited paper on Biomaterials.

Prof. Dr. Eng. Ion Dumitrache, Rector of the University "Politehnica" Bucharest (left)

Acad. Dan Dascalu, co-ordinator of the working group for the "Micro- and Nanotechnologies" program (right)

MICRO- AND NANOTECHNOLOGIES IN THE RESEARCH PROGRAMME "HORIZON 2000"

In January 2000, The National Agency for Science, Innovation and Technology (ANSTI) proposed a new methodology of financing the research projects in the frame of the programme "Horizon 2000". Each comission on specialties launched the competition for a number of 1-5 general objectives. In the field of micro and nanotechnologies, the auction was organized for two general objectives, both gained by consortia led by the National Institute for Research and Development in Microtechnologies (IMT-Bucharest).

In the following, for each general objective, the consortium, the subsidiary objectives and the main projects are presented.

A) "New materials, technologies and microsystems for life and environment quality" (started on July 2000)

Consortium: National Institute for Research and Development in Microtechnologies (IMT-Bucharest), Research Centre for Macromolecular Materials and Membrans (CCMMM), National Centre for Consulting in Environment Protection (UPB-CNC) and Research Centre in Theoretical and Applied Phyisical Chemistry (UB-CCCFTA)

• Natural and syntetical micro and nanostructures (liposoms) with applications in the directional transport of some active principles (**subsidiary objective**)
*"Fluide biocompatible micro and nanostructures for the controlled transport of active principles" (**project**)*
• Techniques and structures for chemical and biological microprocessing, microseparation, microanalysis and microinstrumentation
"Microsystems for fluid microdosing and clinical diagnosis"
"Microanalysis technics based on silicon integrated microcromatography"
• Microstructures and microsystems for the study of tissue electrical activity, physiological activity and for cell manipulation
"The multichannel microprobe for recording neural activity"
"ISFET based sensors for monitoring of the Ca+2, Mg+2, Na+, K+ ions and ph, in vitro and in vivo"
• Nanostructured materials for prosthesing, investigation biomedical microdevices (microelectronics, biosensors) and biometric methods (identification, diagnostic)
"Electrodic structures for biosensors for ex vivo application"
"Cancer finding and therapy using non-conventional microdevices: microsensors and microapplicators"
• Computational techniques (molecular calculation included), hardware architectures and microrobotics elements elaborated pn biological (biometric) principles
"Biomimetic computational techniques used for the analysis of transport in nanostructured porous media and of molecular magnetism"
"Architectures and computational techniques for evolutive hardware used for artificial life"
• Composite nanoparticles and nanostructures with selective properties
"Functionalized nanoparticles and nanostructures with selective properties used in separations with ecological impact"
• Materials and devices for recognizing and eliminating polluting agents to monitor and protect the environment
"Cathalytic membranar microstructures for elminating polluting agents in gazous phase"
"Nanocomposite materials for microdevices used for eliminating polluting agents"
• Substance and radiation detectors for controlling environment pollution (detection, monitoring, analysis) and technical and natural environment impact on health
"Detection and analysis of heavy metals from rivers, lakes and Danube Delta"
"Tehnologies for the realization of integrated microstructures for flammable and toxic gas detection"
• New materials and technologies for sensors intended to testing food quality and animal health monitoring
"Detection system for polluted media in liquid food"
"Chemical microsensors arrays for the detection of volatile compounds from degraded foods"

B) Micro- and nanotechnologies for competitivity and lasting development (started on September 2000)

Consortium: National Institute for Research and Development in Microtechnologies (IMT-Bucharest), National Institute for Research and Development in Materials Physics (INCDFM) and National Institute for Research and Development in Lasers, Plasma and Radiations (INCDFLPR)

• Nanostructured materials with special properties (**subsidiary objective**)
*"Nanostructured materials and nanosystems based de metals and semiconductors" (**project**)*
"Nano-composite materials based on polymers and organo-metalic compounds"
• Microstructures and nanostructured materials obtained with laser and plasma technologies
"New composite ceramic-carbon nanostrured materials"
"Nanostructured films used in optoelectrinics and microelectronics"
• New materials and technologies for electronic, opto-electronic, electrochemical devices, microstructures, microtransducers and electro-opto - mechanical microsystems with applications in intelligent fabrication and in power producing, storage, transport and control
"Technologies for interferometric and microoptic microstructures (MOEMS) on silicon"
"Theoretical and experimental studies to developing a technology on the basis of nano-structurated semiconductor oxide layers for energy conversion and storage devices"
"Software development for advanced processing of the experimental data resulted from different characterization techniques"
"Development of technologies for photovoltaic devices based on amorphous and crystalline silicon thin-films and on transparent and conducting oxides (TCO) with applications in mecano-opto-electrical microsystems."
"Technologies and processes for nanostructured functional material preparation and applications in electro-opto-mechanical microsystems"
• New materials and microtransducers for applications in building as well as land and air transport
"Sensors for the automotive industry"
"Behaviour of microsystems in the hostile electrical and mechano-climatic environment of the automotive industry"
• Photonic micro- and nanostructures with applications in information and communication technology; devices for nuclear radiation detection
"Development of semiconductor microcavity-photodetectors for applications in optical processing and optical communication systems"
"Development of hybrid technologies for subsystems used in optical communication"
• New materials, microstructures and microsystems for communications and radiolocation in the field of centimetric, millimetric and submillimeter waves.
"MEMS technologies, design modelling and new materials for applications in centimeter, millimeter and submillimeter waves circuits"
"Dielectric materials with controled temperature coefficient and high permitivity used in the field of centimetric and millimetric waves"

CAS 2000

Invited Papers

"**ELECTRICAL PROPERTIES OF NANOCRYISTALLINE POROUS SILICON**", M.L. Ciurea, V. Iancu*, National Inst. of Materials Physics, *"Politehnica" Univ., Bucharest, Romania.
"**MICROSYSTEMS IN THE FAR EAST - A REVIEW**", A. El-Fatatry, BAE Systems, Advanced Technology Centre, Chelmsford, UK
"**ADVANCED FUNCTIONAL MATERIALS AND THEIR APPLICATIONS**", A. Jelenski, Inst. of Electronic Materials Technology (ITME), Warsaw, Poland
"**MICRO AND NANOTECHNOLOGIES - A ROMANIAN R&D PROGRAMME OPEN TO EUROPEAN COOPERATION**", Lanyi Szabolcz, President of the National Agency for Science, Technology and Innovation, Romania
"**INNOVATION OF MICROSYSTEMS IN NORWAY**", P. Ohlckers1,2, A. Ferber1, Fifty-four point Seven, 2Univ. of Oslo, Norway.

Special sessions

Friday, October 13, 14:30 - 16:00, Room "A"
Session 13: MICRO AND NANOTECHNOLOGIES
Chairman: A.Müller, IMT-Bucharest, Romania

Friday, October 13, 14:30 - 16:00, Room "C"
ROUND TABLE: BIOMATERIALS
Chairperson: E. Andronescu, "Politehnica" University, Bucharest, Romania

Friday, October 13, 16:30 - 18:30, Room "A"
Special NEXUS Session (Invited papers)
Opening: A. Jelenski, Chairman of NEXUSPAN,
Institute of Electronic Materials Technology (ITME), Warsaw, Poland

Friday, October 13, 18:30 - 20:00, Room "C"
Special poster presentation of NEXUSPAN National Contact Points

Friday, October 13, 18:30-20:00, Room "B"
Session 14: MICRO AND NANOTECHNOLOGIES 2 (Poster)
Chairpersons: I. Kleps, IMT-Bucharest, F. Craciunoiu, IMT-Bucharest, Romania

ROUND TABLE: BIOMATERIALS*

Chairperson: **E. Andronescu**, "Politehnica" Univ., Bucharest, Romania

SINTERED CERAMICS IN THE CAO - ZRO_2 - AL_2O_3 - P_2O_5 SYSTEM, **V. Burghelea, A. M. Melinescu, C. Birsan**, "Politehnica" Univ., Dept. of Science and Engineering of Oxide Materials, Faculty of Industrial Chemistry, Bucharest, Romania

HIDROXIAPATITE AND ALUMINOUS BIO-COMPOSITE, **E. Andronescu, E. Stefan, C. Ghitulica**, "Politehnica" Univ., Dept. of Science and Engineering of Oxide Materials, Faculty of Industrial Chemistry, Bucharest, Romania

BIOVITROCERAMICS USED FOR BONE DEFECTS REPAIR, **D. Antonescu, M. Popescu, T. Negreanu**, Orthopaedics Clinic Foisor, Bucharest, Romania

MICROSTRUCTURAL CHARACTERIZATION AND MECHANICAL PROPERTIES OF HYDROXY-APATITE THIN FILMS GROWN BY PULSED LASER DEPOSITION ON Ti-ALLOYS SUBSTRATES, **V. Nelea, C. Ristoscu, G. Marin, I. N. Mihailescu, *C. Morosanu**, INFLPR, *INFM, Bucuresti, Romania

MICROORGANISMS AS BIOMATERIALS USED IN BIOSENSORS FOR ENVIRONMENTAL MONITORING, **I.Ardelean, L. Dumitru, G. Zarnea**, Inst. of Biology, Center of Microbiology, Romanian Academy, Bucharest, Romania

APATITIC CERAMIC BIOCOMPOSITES. TESTS "IN VITRO", **V. Burghelea[1], A. Ianculescu[1], A. Melinescu[1], V. Laurentiu[2], C. Tardei[3]**, [1]"Politehnica" Univ., [2]ICECHIM SA, [3]ICPE SA, Bucharest, Romania

*This is a satellite event to the CAS 2000. The contributions are not included in the Conference Proceedings

Sinaia: The Foisor Palace

An informal meeting of the NEXUSPAN participants took place with the occasion of a working lunch planned, on October 14th, in the very special environment of the Foisor Palace. A chamber concert (Boccherini, Schubert) performed by the Group CREDO offered delightful moments to all CAS participants.

Excerpts from the invited paper at CAS'2000: Micro and nanotechnologies - a Romanian R&D programme open to European co-operation

presented by Lanyi Szabolcs
President of the National Agency for Science,
Technology and Innovation,
Bucharest, Romania

……

A new politics: orientation towards the advanced research

Romania is experiencing considerable difficulties in maintaining its scientific and technological potential. First, difficulties are originated by the low level of economic development: the economy is weak and cannot sustain directly and indirectly (through the public founding) the research and development activities. ……..

The message of the president of the Romanian Agency for Science, Technology and Innovation (ANSTI) for the scientific community was to join the forces in approaching the new challenges of the advanced research.

There is no time to complain or regret the past. The best thing to do is *to move forward towards the new fields of research, which offer better opportunities for the future.*

The importance of involving the Romania in advanced research

Approaching the new fields of advanced research has *advantages*. First, it is clear the fact that a new and substantial effort of Romania to invest in research will show its results in a long period of time (5-10 years). Therefore, orientation towards the advanced research (with a potential which is not yet valorised) makes sense. Secondly, the Romanian research groups involved in advanced research will be more attractive for the external partners. Of course, a substantial effort in these areas requires important investments, attraction of qualified human resources.

Romanian participation to advanced research: possibilities and opportunities

……..
The initiative of "European Area of Research and Innovation" opens new possibilities of co-operation at the European level. One possibility is the access to big (and very costly) research facilities. There are also other schemes, partially funded by EU, which already allow the access to technological services. This is important for a country like Romania (and for European countries in general), because reduces the "barrier" of high investments necessary for part of the advanced research.
……

Steps in the evolution of the domain of micro and nanotechnologies in Romania

The importance of the domain of microtechnologies was recognised in Romania as early as 1991, when a Centre of Microtechnology was set up by the Ministry of Education and Research. This Centre became in 1993 the Institute of Microtechnology (IMT), supervised by the Ministry of Research and Technology. In the same year (1993), a special section of "microtechnologies" was introduced along with Information and Communication Technologies in the National Plan for Research and Development……. The national R&D programme "Horizon 2000", launched in 1996 contains a separate section titled "microtechnologies" (and including nanotechnologies). ……..

A rapid development of the domain policy took place this year. The commission of "microtechnologies" of the Consultative Board of the National Agency for Science, Technology and Innovation (ANSTI) was reorganised as a multi-disciplinary commission of "micro and nanotechnologies". Scientific seminars of "Micro and nanostructures" organised by ANSTI and the Romanian Academy took place in February and June 2000. After and extensive debate of the scientific community, the competition for the financing of two complex multi-disciplinary objectives (2000-2002) was launched. The two objectives, already under execution are: a) New materials, technologies and microsystems for the quality of life and of the environment; b) Micro and nanotechnologies for competitivity and sustainable growth.

In June 2000, the Consultative Board of ANSTI decided to launch new programmes of the National Plan for Research, Development and Innovation (PNCDI). The new programmes are defining the priorities of research in this country. One of these programmes (MICRONANOTECH) is devoted to "Micro and Nanotechnologies"……..

In a special session of CAS 2000, Microcosm Technologies was presented by Dirk Backhaus, Marketing / Business Development Manager CE

Microcosm Technologies, Inc. provides a unique end-to-end development environment for successful creation of micro-electro-mechanical systems (MEMS) and fluid molecular systems. They currently employ 105 people worldwide. Their software, professional services, and manufacturing partnerships facilitate the creation of MEMS solutions that are revolutionizing the full spectrum of industries, and are having explosive impact on telecommunications and bio-technology. The software is scalable to the development environment. Developers can affordably license multiple seats of layout and/or solid modeling tools for the design engineers' desktops, and export designs to a company central point (or to Microcosm's Professional Services staff) to perform physics analysis using the Microcosm tools or tools such as ANSYS. The design kits enable virtual prototyping that eliminates costly product iterations.
Recently, IMT-Bucharest acquired from Microcosm Technologies a software for MEMS development.

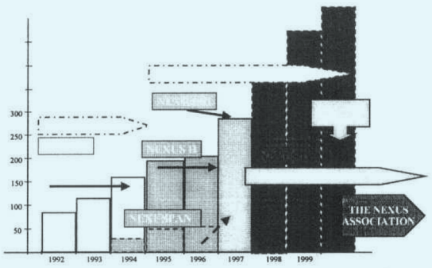
NEXUS 2000: A RoadMap for Microsystems

Ayman El Fatatry, BAESYSTEMS - Advanced Technology Centre, NEXUS Vice Chairman
Gaetan Menozzi, MEMSCAP, NEXUS Chairman

Ayman El Fatatry

NEXUS, the European network of excellence in microsystems, is about to embark on a major transition of becoming an Association representing members from across the world. NEXUS started life, in 1992, as an academically-driven network representing the interests of various researchers working on micro-fabrication and micromachining techniques. This specific phase of the Network was particularly useful in forming the basis of a wider consortium addressing the more general topic of microsystems. During 1995, NEXUS II amalgamated the Eastern European activities in microtechnologies under the banner of NEXUSPAN. In addition, representation on the Executive Board shifted from an academically strong group to that of an industrially-driven one. This shift was deemed necessary by both the NEXUS members and the European Commission in order to speed the process of MST technology exploitation and transfer.

The strength of this industrial presence was consolidated in 1997 with the formation of NEXUS III. This phase of NEXUS also saw the introduction of the User-SupplierClubs, the beginning of the market analysis investigation and the start of benchmarking visits outside the European Union. NEXUS IV, was launched in 1998 with a strong base of User-Supplier-Clubs led by industry. In essence, NEXUS transferred from an academic network to an applications / industrially - driven network of MST technology users and suppliers. The presence of academia was consolidated within the User-Supplier-Clubs, thereby, maintaining the important role of academia and research within this network. Basically, NEXUS has, over the past 8 years, seen its role shift from an academicallydriven network into an industrially-driven one. In addition, the size of the network increased substantially to its current level of almost 450 members representing all of the European nations. The natural progression for this network is to expand on a global basis.



Over these years, NEXUS has been instrumental in promoting microsystems across Europe through a number of concerted tasks. The main success, however, has been achieved through the activities of the User-Supplier-Clubs (USCs). These unique groups have provided the basis of most of the NEXUS deliverables in terms of market forecasts, technology roadmaps and international benchmarking information.

To date, NEXUS has been supported, primarily, by the European Union (ESPRIT / IST - DG XIII). The European Union support averaged at approximately 1 M Euros per year. This level of funding has been (and continues to be) utilised to support the main activities and dissemination functions of this Network.

The increasing level of support has prompted the Executive Board of NEXUS and the European Union to consider alternative routes for operating such an organisation. The main driving factors were:

➢ The network has been operational since 1991 and has set-up a stable infrastructure which should be self sustaining.

➢ Most members have, by now, accepted the benefits offered them by NEXUS.

➢ The European Union has fulfilled its role in setting up the necessary infrastructure.

for such a network as would be required for a new technology.

➢ The operation of the Network's office has been stream-lined and the management of the Network has become effective and efficient over the years.

➢ Outputs from the NEXUS organisation have attracted significant interest from both within and without the European Community.

Given these encouraging signs, the NEXUS Executive Board members have chosen to transfer the status of this organisation from that of a Network to that of a legal, nonprofit, Association. Such an Association will be registered as an official body and managed by a professional legal entity.

The transition of NEXUS from a fully-supported, European Union, network to that of a fully-sponsored, independent, Association will be a gradual one. This gradual transition will be initiated during the first 12 months of the current phase of NEXUS, whereby, the infrastructure and foundation of the Association will be set and the mechanisms of sponsorship agreed by all the sponsoring members.

THE NEXUS MICROSYSTEMS ASSOCIATION (NMA) - The Benefts

The NMA will undertake the co-ordination of a number of core activities and tasks aimed at benefiting either the specific or general needs of its members. Examples of these benefits include:

• Members will have the option ofjoining established User-Supplier-Clubs, thereby, addressing applications which are specific and of relevance to their businesses.

• Members will be offered the opportunity and infrastructure to set-up new UserSupplier-Clubs of choice.

• In this context, the NMA offers the appropriate infrastructure and the unique opportunity for members to meet new partners through the User-Supplier-Clubs.

• The NMA Steering Committee will sponsor specific tasks undertaken by members including the generation of Technology Roadmaps.

• Through the User-Supplier-Clubs, all proactive members will be able to participate in the generation of and /or access to targeted information including the technology roadmaps relating to microsystems applications and developments

• The NMA Steering Committee will co-ordinate support and facilitate market investigation activities undertaken by members on its behalf.

• This information on market opportunities as well as market analysis reports will be made available, at preferential rates, to all of the NMA members.

• All NMA members will receive regular information on European and world-wide developments, events and information relating to microsystems.

• Through the NMA, members will be in a better position to influence the scope of European Research Programmes.

• The NMA office will make available, to all members, a comprehensive list of contacts including a database of world-wide microsystems capabilities.

• As an influential body, the NMA will represent members views on Standards both at National and International levels.

• All members of the NMA will receive regular bulletins, news-letters and trade journals such as MST-news.

• Through participation at conferences, exhibitions and seminar, the NMA will provide opportunities for members to publicise their interests and businesses.

In essence, NEXUS is currently an influential body representing an important network of European organisations with interests in microsystems technologies. NEXUS, as an Association, will exploit this strength by repositioning this network on a world-wide arena. European organisations have an excellent opportunity to become world players in this field of technology. The NEXUS Microsystems Association will be instrumental in securing this goal.

NEXUS meetings held in Sinaia

Within the framework of the annual International Semiconductor Conference CAS'2000, held in Sinaia (Romania), NEXUS sponsored and organised various sessions and meetings which aimed at further enhancing the collaboration between MST groups in Central / Eastern Europe and Western Europe. These events were hosted by **Prof. Dan Dascalu**, General

Chairman of CAS'2000, head of the National Institute for R&D in Microtechnolo-gies (IMT) in Bucharest, and member of the NEXUSPAN Steering Committee.

Friday, 13 October 2000 (the last day of the conference), was completely de-voted to Micro- and Nanotechnologies, with numerous invited talks given by international speakers and two large poster sessions. During the morning ses-sion, among others, two members of the NEXUS Executive Board (EB)

gave invited presentations: A. El-Fatatry (BAE SYSTEMS, UK) presented a perspec-tive on "Microsystems in the Far East" based on the NEXUS Far East mission, while **A. Jelenski** (ITME, Poland) presented a paper on "Advanced Functional Materials and their Applications". During the afternoon, a Special NEXUS Ses-sion provided a comprehensive overview of current and planned NEXUS activi-ties: A. El-Fatatry, Vice Chairman of NEXUS, explained the way "Towards a Microsystems Association" and, subsequently, the "NEXUS Roadmap for Mi-crosystems". Following, the approach of the NEXUS User-Supplier Clubs was presented and illustrated by the example of 3 club: "Aerospace & Geophysics" (presented by A. Jelenski on behalf of J. Suski, "Telecommunication" (A. El-Fatatry), and "CAD" (P. Salomon). Finally, A.Jelenski presented plans to establish a new User-Supplier Club on "Functional Materials for MST". These pres-entations were open to all CAS participants and were attended, in spite of the fact that it was the last day of the conference, by about 40 participants. The presentations were followed by a special poster session organised by the at-tending National Contact Points, representing NEXUS(PAN) within nine Central/East European (CEE) countries The NCPs presented their, impressive, MST related R&D research results. In the evening, a special NEXUS cocktail party was held as an occasion to continue discussions in an informal atmos-phere.

On Saturday morning (October 14), a meeting was held (attended by about 25 people) which was devoted to the exchange of views between the attending National Contact Points (NCPs, from Belarus, Hungary, Lithuania, Moldova, Poland, Romania,

Russia, Slovakia, and Ukraine), the NEXUSPAN Steering Committee, and the NEXUS EB. It started by a presentation of **H.-C. Petzold**, summarising the achievements of NEXUSPAN over the past years, followed by short presentations of the attending NCPs on what they did in that role in the past, and how they see NEXUS in the future.

In the concluding Round Table discussion, chaired by A. El-Fatatry, some key points that are considered crucial for the future involvement of Central/East European member organisations in NEXUS were elaborated:

The CEE attendees expressed their concerns over the lack of funds e.g. to support attendance at conferences, exchange visits etc. It was emphasised, however, that funding limitations have been imposed across all of the NEXUS activities and not just those of the CEE/NEXUSPAN. On the other hand, the EB representatives confirmed the availability of a budget, under NEXUS-2000, dedicated to the integration of NEXUSPAN members within the pan-European MST community. These funds are, however, spread across all of the NEXUS activities that have been agreed with the EU. The NEXUSPAN members, along with all the other NEXUS members, are able to access these funds through active participation in these tasks.

It was agreed that the main aim of NEXUSPAN is to disseminate information to promote the activities in Eastern Europe, in order to assist in the exploita-tion of the R&D undertaken by the NEXUSPAN members. One route for dis-semination is through the USCs. The NCPs were, therefore, encouraged to participate within the USCs, either by attending the meetings or through electronic means, and to encourage, in turn, their own national MST com-munity to actively participate in the USCs and the tasks of NEXUS.

The meeting was found to be constructive, and specific actions decided at the meeting are expected to help in enhancing the process of interaction and dis-semination between NEXUS members in the East and West.

The eventful days in Sinaia were concluded by an excellent dinner for the invited speakers and NCPs at the beautiful Foisor Castle, a former residence of the Romanian King, today used by the President of the Romanian Academy of Sciences for receptions. As a cultural highlight, a chamber music concert was held, exclusively for the NEXUS guests.

Details of the programme at photos taken during the various sessions can be found at the conference website http://www.imt.ro/cas/

On behalf of all the participants, the authors would like to thank Prof. Dascalu and his team, especially Mrs. Doina Vancu, for the excellent organisation of the various NEXUS events and the warm hospitality that they enjoyed during their stay in Romania.

Hans-Christian Petzold
Ayman El-Fatatry

NANOMATERIALS AT ROCAM'2000 - CONFERENCE ON ADVANCED MATERIALS
October 23th-25th, Romanian Academy

SESSIONS ON NANOMATERIALS

1. Poster session

"The Prediction of Band Gap Value in Porous Silicon Through the Modeling of Pore Formation", A. Dafinei, D. Ionita (University Bucharest)

"Metal Structures in Quartz Crystals; Fractal Properties", I.Enculescu, Brandusa Iliescu, I.Istrate (INCDFM)

"Absorption and Emission of Ag Aggregate Centers in KCl Crystals", Monica Enculescu, V. Topa (INCDFM)

"Annealing influence on magnetic behaviour of nanocrystalline Fe-Hf-B based ribbons", H. Chiriac, C. Hison, M.Neagu (INCDFT Iasi)

"Recrystallisation Phenomena During High Energy Ball Milling", Gabriela Nicoara, Nicoleta Popescu-Pogrion, Victoria Husar (INCDFM)

"Metal Structures in Quartz Crystals; Chemical Processes", Ioana Pera, I.Enculescu, Gabriela Alexe, Brandusa Iliescu, S.Polosan (INCDFM)

"Properties of metal clusters embedded in KCl matrix", S. Polosan, Elena Apostol, V. Topa (INCDFM)

"Methods for nanoparticle size determination", Lucia Meahcov (MATPUR SA)

"Magnetic and structural properties of g Fe2O3 nanoparticles dispersed in a silica matrix", I.Hrianca, C. Caizer, C. Savii, M.Popovici (Romanian Academy)

2. Oral session

"Structural and magnetic investigation of mechanically alloyed $Fe_{90}M_7B_3$ (M=Nb, Zr, Hf) powders", H. Chiriac, A.E.Morga, M.Urse, C.Hison (INCDFT Iasi)

"Anodic Porous Aluminium oxide filled by various metals (Co, Cu, Ni). An X-ray diffraction Study", E. Indrea, Stela Pruneanu, G. Mihailescu (ITIM Cluj)

"Sol-Gel Monocomponent Nano-Sized Oxide Powders", Maria Crisan, A. Jitianu, D. Crisan, Marina Balasoiu, N. Dragan, Maria Zaharescu (Inst. Chimie-Fizicai)

"TiO2-Based Nanostructures Sol-Gel coatings for Water Treatment", Maria Zaharescu, C. Trapalis, Maria Crisan, Alexandra Szatvanyi, Mariuca Gartner (Inst. Chimie-Fizicai)

"Magnetic interaction and magnetoresistance in nanoscaled melt-spun materials", Bogdan IDZIKOWSKY (Polish Academy of Science)

"Transition Metal Clusters in a C60 Matrix", R. Manaila, D. Macovei, R. Popescu, C. Giusca, A. Devenyi (INCDFM)

"Gold Nanoclusters Obtained in KCl Crystals", V. Topa, E. Apostol, M. Enculescu, E. Vasile (INCDFM)

MICRONANOTECH in the National R&D Plan

The programme "MICRONANOTECH" emerged from the researches performed in the frame of the programme "Horizon 2000", where a multidisciplinary approach was needed. Especially, the two general objectives promoted in year 2000 about micro and nanotechnologies ("New materials, technologies and microsystems for life and environment quality" and "Micro- and nanotechnologies for competitivity and lasting development") led to the involvement of specialists from various fields: microelectronics, physics, biology, chemistry, mathematics, etc. It is the aim of the programme "MICRONANOTECH" to put together the effort of all these specialists, trying to build a coherent development of this new and promising field, micro and nanotechnology, already considered by USA and European countries as a scientific priority for the near future (see the American Initiative on Nanotechnologies, started in January 2000!). This programme will allow to have under the same cover all the research activities on micro and nanotechnologies: basic researches, pre-competitive researches, competitive researches and technology transfer.
Elaborating new materials, proceses, technologies, simulation and characterization techniques, micro and nanostructures, integrated (sub)systems and microsystems will be the main purpose of the programme "MICRONANOTECH".
Also, this new programme is interconnected with other new programmes, such as "New materials" or "Life and Health". The new programme of "micro and nanotechnologies" (MICRONANOTECH) was approved as part of an extension of the National Plan for Research, Development and Innovation (PNCDI), by the Decision No. 1013 of the Romanian Government (26th October 2000).

Subprograms of the MICRONANOTECH program

MNT 1 Microelectronics, power integrated electronics, optoelectronics, microwaves

· Specialized electronic circuits integrated in the microelectronic technology
· Devices and modules for power control and conversion (power semiconductor devices, solar cells, electrochemical microbatteries, consumption monitoring systems included)
· Microelectronic, microphotonic and microwave integrated subsystems
· Optoelectronic and microwave devices necessary for information processing and transmission
· Photonic micro- and nanostructures with applications in communications
· New materials, microstructures and microsystems for communications and radiolocation in the range centimetric, millimetric and submillimetric waves
· Substance and radiation detectors for environment pollution control

MNT 2 Electro-Opto-Mechanical Microstructures and Microsystems

· New materials and technologies for electro-opto-mechanical microstructures and microsystems with applications in intelligent fabrication
· Microstructures and microsystems used in power producing, storing transport and control
· Microstructures, microtransducers and microsystems with applications in communications, information processing and aerospace applications
· Microstructures and microsystems for chemical and biological microprocessing, microseparation, microanalysis and microinstrumentation
· Sensors for testing food quality and animal health monitoring

MNT 3 Microtransducers and intelligent materials

· Microtransducers (sensors and miniaturized and integrated driving elements): materials, demonstrating technologies with applications in industry, agriculture, zootechny, constructions and in land and air transport
· Intelligent microsystems (intelligent sensors and sensor matrices included) with applications in industry, agriculture, zootechny, constructions as well as land and air transport
· Materials, devices and microsystems of recognizing and eliminating the pollutant agents for environment monitoring and protection

MNT 4 Systems and Structures for Interfacing Living Matter and Biomimetics

· Microdevices and microsystems of biomedical investigation (microelectrodes, biosensors, microfluidics elements etc.) for cell and genetic material manipulation and study, included
· Computational technics (molecular computation, included), hardware architectures, microrobotics microsystems and elements conceived on biological (biomimetic) principles

MNT 5 Nanostructures and Nanostructured Materials

· Nanostructured materials for biomedical applications (prosthetic biomaterials included)
· Composite nanoparticles and nanostructures with selective properties
· Nanostructures and nanostructured materials for applications in electronics, electrotechnics, mechanics, metallurgy etc.
· Microstructures and nanostructured materials obtained with laser and plasma technologies (materials with a large specific surface, over 50m2/g; structures with increased chemical reactive surfaces)
· Nanostructured materials with special properties (soft and hard magnetic nanomaterials, icosahedral nanostructured alloys with high micromechanical characteristics, carbon nanostructures: conducting polymers/carbon nanostructures based nanocomposites, nanosystems metal - C60 fulerene with charge transfer at interfaces, adsorption processes on micro- and nanorugged structures used in the sensor technology, nanocrystalline Si and Si/C based nanostructured materials with optimum properties for sensor applications, pattern memory materials for actuators and micropumps, magnetic nanostructures with a huge and colossal magnetoresistance, nanocomposite materials)

MNT 6 Support Activities

· Centres and activities of training through research and technological support in microsystems, microelectronics and nanostructured materials
· Networks of research laboratories

MME 2002

Micromechanics Europe
October 6-8, 2002
Sinaia, Romania

On the 2nd October 2000 at the Upsala University Auditorium, the Micromechanics Europe Workshop Steering Committee has decided with unanimous vote that the 13th Edition of this Conference will take place between 6-8 October 2002 at Sinaia, Romania

After Twente 1989, Berlin 1990, Leuven 1992, Neuchatel 1993, Pisa 1994, Copenhagen 1995, Barcelona 1997, Ulvïk 1998, Paris 1999, Uppsala 2000, Cork 2001, the prestigious conference will be held for the first time in Eastern Europe. This is the result of the extremly active and valuable presence of the IMT-Bucharest contributions at the previously editions of this conference.

CAS 2001

INTERNATIONAL SEMICONDUCTOR CONFERENCE
24th Edition
October 9-13, 2001, Sinaia, Romania

The International Semiconductor Conference (CAS) is a yearly event organized by the National Institute for Research and Development in Microtechnologies (IMT-Bucharest). The Conference is co-sponsored by IEEE Electron Devices Society, Romanian National Agency for Science, Technology and Innovation (ANSTI), IEEE-Romania Section, Electron Devices Chapter. The event takes under the aegis of the Romanian Academy and the Electrochemical Society, Inc.

Deadlines:

- **15th April, 2001**: Submission of the contributed and invited papers;
- **15th June, 2001**: Notification of the final acceptance of contributed papers .

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