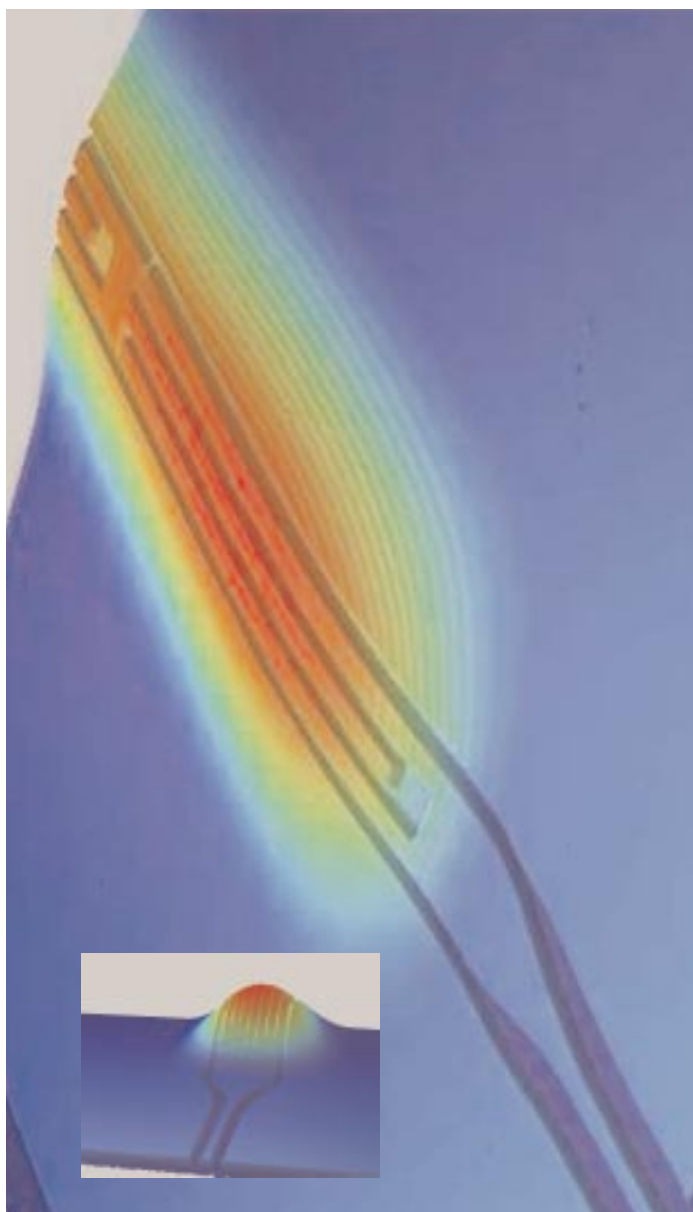


MICRO AND NANOTECHNOLOGIES BULLETIN

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MARCH 2001



White Light Interferometry analysis performed at Uppsala University of 77 GHz and 38 GHz (inset) filters supported on 2 μ m thin GaAs membrane-structures manufactured by FORTH-IESL Heraklion and IMT-Bucharest (in the frame of MEMSWAVE project, presented in page 12)

Micro and nanotechnologies in the VIth Framework programme

Micro and nanotechnologies are explicitly present in two main priority areas of scientific research and technological development in the proposal for the VI Framework Programme, put forward by the European Commission (February 2000).

The first priority area is "*Information society technologies*".

Here, the most important action line is "*Components and microsystems*", described as "*miniaturised and low-cost components based on new materials and integrating extended functionalities*". In fact, some of these components are electronic sub-systems or even systems, as well as micro opto-electro-mechanical systems (MOEMS), many of them with information processing capabilities (intelligent microsystems). In this action line, the effort will be focused on:

a) *micro- and opto-electronic and photonic components;*

b) *nanoelectronics, microtechnologies and microsystems, as well as multidisciplinary research into new materials and quantum devices; new computing models and concepts.*

However, the above technologies should be involved in all other action lines of information society technologies, as follows. They are necessary to develop *multisensorial interfaces* in the action line *Information management and interfaces*, as well as in the development of *ambient intelligence systems*, as well as *interactive and intelligent systems for health, mobility, security, leisure, preservation of the cultural heritage and environmental monitoring*. The latter are related to the action line *Integrating research into the technological areas of priority interest for citizens and business*.

Continued on pag. 3

Research Laboratory for Nanotechnologies - IMT Bucharest

Laboratory head:

Dr. Irina Kleps (tel: 401.4908412; fax: 401.4908238; e-mail: irinak@imt.ro)

Mission:

Theoretical and experimental study of nanostructures - basic physical phenomena and application;

- Development of the new materials, technologies and nanostructures for life and environment quality;
- Development of nanostructure characterization methods.

Activities:

- New concepts and device modeling in vacuum microelectronics field
- Field emitters arrays of nanometric dimensions
- Pressure sensor based on field emission
- Low-frequency fluctuations in solid and solid-state devices
- Porous silicon layers
- Silicon carbide and diamond thin layer
- Magnetic sensors; bipolar magnetotransistors
- Micromechanical systems
- Nano- and microelectrodes for pollution control

Research group:

Dr. Irina Kleps
Dr. Mihai Mihaila
Dr. Dan Nicolaescu (present address: Electrotechnical Lab., Tsukuba, Japan)
Eng. Anca Angelescu
Phys. Marioara Avram
Phys. Mihaela Miu
Phys. Monica Simion
Phys. Narcis Samfirescu (present address: University of Siegen, Phys. Dept, Germany)

Important facilities:

- 5 computers - IBM compatible
- Access on IMT - Technological Departments

Main partners:

- Baneasa S.A-Bucharest
- INCDFM, Bucharest, Magurele
- Faculty of Physics, Bucharest Univ.

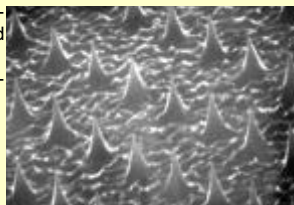
- Duisburg Univ., Phys. Dept., Germany
- Nagoya Univ., Phys. Dept., Japan
- Institute of Advanced Materials, Padova, Italy
- University of Venice, Phys. Dept., Italy
- Institute of Material Science, CSIC, Madrid
- Institute of Microelectronics - NCSR "Demokritos", Athens, Greece
- Institute of Microtechnics, Mainz, Germany.

Main projects:

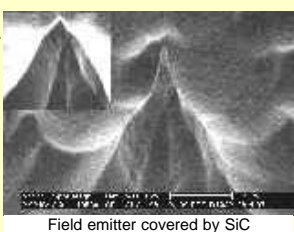
- Silicon based light emitting devices for optical interconnects (SBLED), National R&D Program (1998-2001), Inco-Copernicus nr. 977037 (1998-2001);
- Technology of nanoelectrode (NE) fabrication based on chemical vapour deposition processes, National R&D Program (1999-2001), Bilateral Romanian- Italian cooperation (1999-2000);
- SiC and diamond layers: preparation, characterization and microelectronics applications, National R&D Program (1999-2000), Bilateral Romanian- Spanish cooperation (1999-2000);
- Evidence of lattice participation in the generation of 1/f noise in MOS transistors, Research grant - Romanian Academy (1999-2000);
- Detection system for polluted media in liquid food, National R&D Program (2000-2002); Project EMERGE, Contract No.: HPRI-CT-1999-00023
- Detection and analysis of heavy metals from rivers, lakes and Danube Delta National R&D Program (2000-2002); Bilateral Romanian- Italian cooperation (2000-2002);
- Fabrication technology for micromachining magnetotransistors, RELANSIN project, 2001-2003;

Recent papers:

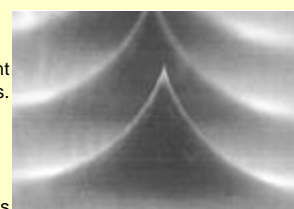
- M. Draghici, M. Miu, V. Iancu, A. Nassiopoulou, I. Kleps, A. Angelescu, M. L. Ciurea, Oxidation-Induced Modifications of Trap Parameters in nanocrystalline Porous Silicon, Phys. Stat. Sol. (a) 182, 239 (2000).
- M. Mihaila, "Phonon fine structure in the 1/f noise of metals, semiconductors and semiconductor devices", Lecture Notes in Physics, Springer Verlag (in press).
- D. Nicolaescu, V. Filip, J. Itoh, and F. Okuyama, Analysis of a pressure sensor using n-Si/ nitrogen doped diamond cathodes, J. Vac. Sci. Technol. B 18(2), 1077-1080, 2000.



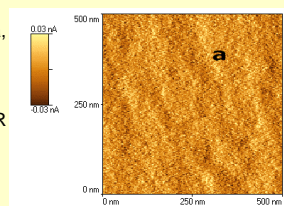
Field emitter array



Field emitter covered by SiC



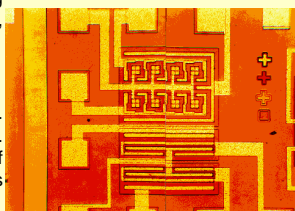
Nanoelectrode array (design - IMT-Bucharest; fabrication - IM-Mainz)



Porous silicon AFM image



DLC (Diamond Like Carbon) selective deposition



Magnetic field sensor: Lateral magnetotransistor (layout)

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- Editorial: *Micro and Nanotechnologies in the VIth Framework programme*
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Micro and nanotechnologies in the VIth Framework programme *continued from cover page*

Of course, micro and nanotechnologies are representing the basic hardware technologies for the development of the action line *Communication and computing infrastructures*. They are necessary in order to develop *the new generations of wireless and mobile communications systems and networks; satellite communication networks; all optical technologies* etc.

The second priority area we have been speaking about is *Nanotechnologies, intelligent materials and new production processes*. Here, the first action line of interest is named *Nanotechnologies*, with objectives like *supramolecular architectures and macromolecules; nano-biotechnologies; nanometre-scale engineering techniques to create materials and components*; and with applications in areas such as *health, chemistry, energy, optics and the environment*. The second line is called *Intelligent materials*, and the expected applications are in *transport, energy and the biomedical sector*. Even the third line, *New production processes*, is involved, since *flexible and intelligent manufacturing systems* cannot be developed without intelligent microsystems in general and intelligent microtransducers in particular.

Moreover, almost all priority areas from the next framework programme, involve micro and nanotechnologies. This is especially true for life science and technologies, since living organisms are structured both at micro and nanoscale. Therefore, micro and nanotechnologies are important for the priority areas *Genomics and biotechnology for health and Food safety and health risks*. Of course, miniaturisation is a key issue for *Aeronautics and space*, another priority area. Finally, the area *Sustainable development and global change* should benefit from micro and nanotechnologies in a few ways, namely through a) renewable energy sources, energy savings and energy efficiency; b) intelligent transport; c) new concepts in solar photovoltaic technology etc.

Therefore, micro and nanotechnologies seem to represent a fundamental package of technologies for the immediate and long-term future.

Dan Dascalu

Romanian participation at events organized by European Commission - Information Society Essential Information Society Technologies and Infrastructures - Microelectronics

"Project partnering in microelectronics and opto-electronics" Budapest (Hungary), 26 - 27 January 2001

Romanian contributions:

„Facilities and competences in micro-electronics and optoelectronics in the Centre of Microfabrication in Bucharest”
- Dr. Dana CRISTEA, IMT Bucharest

„Romanian Contribution on Electronic Packaging Networking in CEE Countries”- Prof. Paul SVASTA, University „Politehnica” Bucharest

"NAS-Europractice / Nexus Workshop" Warsaw (Poland), 22-23 February 2001

Romanian contribution:-
Prof. Dan Dascalu (IMT Bucharest) -
"Activities in microsystem technologies"



Technology Day East Europe "Design, CAD, characterisation and testing issues in microsystems and subsystems" Budapest (Hungary), 26 February 2001

organised and supported by:
NEXUS User-Supplier Club "CAD",
Contact: Patric Salomon, Co-ordinator
European Commission, Directorate
General Information Society,
Contact: Thomas Reibe

hosted by: Budapest University of
Technology and Economics,
Contact: Prof Szekely, Veronika Timar-
Horvath

Romanian contributions at sections:

Experience of NAS partners who have
been included in EU RTD projects

• Dr. Ioan Pavelescu, IMT Bucharest,
Romania

Presentation of local networks including
universities, institutes and industrial players
by NAS countries (project ideas, partners
sought, ...)

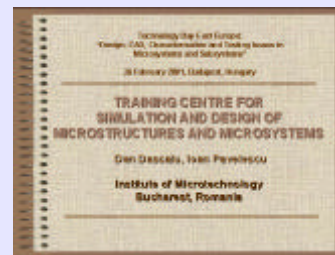
• Training Centre for Simulation and
Design of Microstructures and
Microsystems, Prof. Dan Dascalu and Dr.
Ioan Pavelescu, IMT Bucharest, Romania

• Design and Simulation Techniques in
Electrohydraulic and Mechatronic
Systems, Dr. Gabriela Matache, IHP
Bucharest, Romania

• Related Experience, Adrian Florea,
University of SIBIU, Romania

Partnering Working Groups (short statements
of interested parties about potential
proposals): Design and CAD tools

Prof. Dan Dascalu, Ioan Pavelescu, IMT
Bucharest, Romania



Dr. Norocel-Dragos Codreanu, CETTI
Bucharest, Romania

Dr. Gabriela Matache, IHP Bucharest,
Romania

Characterisation of circuits, components
etc. and Testing

Dr. Gabriela Matache, IHP Bucharest,
Romania

Dr. Norocel-Dragos Codreanu, CETTI
Bucharest, Romania

Micro and Nanotechnologies: Between National Priorities and European Co-operation

Friday, February 16-th, 2001, Assembly Hall of the Romanian Academy 125 Victoria Road

Interventions, Communications:



Opening Address:
Eugen Simion, President of the Romanian Academy

"Biomedical Applications of Nanotechnologies"

*Prof. Dr. Victor A. Voicu, University of Medicine and Pharmacy "Carol Davila", Bucharest
Corresponding Member of the Romanian Academy*



Micro and nanotechnology applications in the biomedical domains already have a history and perspectives are very promising. In essence, applications may aim at: identifying, quantizing and fighting against environment pollution, monitoring body functions at various organization levels or controlling, modulating and correcting perturbations induced by various pathogenic factors. Another trend has in view nanostructures and nanomaterials usable for medicine transport to the level of intracellular, nuclear receiver-type therapeutic target. The nanocylindric pore membranes of adequate materials may constitute devices for controlled transport of some compounds. The realization of biomolecular motor nanodevices, where the rotation is produced through adenosinetriphosphate hydrolysis by ATPase and stopped through a chemical inhibitor, suggests the performance level of nanotechnologies inspired from, or applied in the biomedical domain.

"Micro and Nanotechnologies in Electronics Education"

Prof. Dr. Adrian Rusu, Corresponding Member of the Romanian Academy, Head of the Department of Electronic Devices, Circuits and Equipment, University "Politehnica"- Bucharest.



To introduce in the education schedules new training directions implies to reevaluate peak researches by creating new disciplines, but also to modify the fundamental discipline schedule, such as mathematics, physics and chemistry. The faculty of Electronics and Telecommunications, through its specialized Department, Electronic Devices, Circuits and Equipment, has kept up with the changes in microelectronics, more recently in the domain of microsys-



Tutorial on BIOMATERIALS:
Prof. Dr. Ecaterina Andronescu
Minister of Education and Research

tem technologies and nanotechnologies.

To this purpose the department makes for a stronger co-operation with complementary profile faculties and institutes.

"Multidisciplinary Research and Education in the Cognitive Society"

Prof. Dr. Ion Dumitrache, President of the National College of Research for Higher Education, Rector of the University "Politehnica" Bucharest



The paper presents a few action directions regarding the organizing of research in higher education in strong correlation with human resource formation for a knowledge-based society. The importance of research programs in the field of nanotechnologies and the role played by interdisciplinary research in carrying out this program is emphasized.

"The Micro- and Nanotechnology Program and the Profile Education"

Prof. Dr. Ion Munteanu, Pro-Rector of the University of Bucharest



The micro-and nanotechnology program cannot be conceived beyond a permanent formation and training system. This is determined both by the complex nature of the program and the novelties appearing in this field from day to day. The present training system through master's and doctor's degree, at least at faculties of sciences or engineering sciences, is pretty critical. The training programs are very vague, and most candidates for a master's degree, because of the poor social conditions, are employed at companies whose activity is, most times, completely different from the training through the master's degree. From these reasons we suggest that, within the micro- and nanotechnology program, on certain domains having an interdisciplinary nature, formation, research and innovation centres should be set up, with an adequate endowment, where the most performant graduates from profile faculties should be employed on a limited time period (for instance two years). Most times, there is question of finding financial resources to this purpose. Nothing more artificial. To provide resources in this field it is necessary only a more judicious administration of the resources that the country has at present.

"New Challenges for the Research Domain Frontiers at the Beginning of the 21st Century and the 3rd Millennium"

Florin Gh. Filip,
vice-President of the Romanian Academy.

The declaration of the World Science Academies ("Transition to Sustainability in the 21st Century") proposes a few action directions and priorities for the beginning of the century and millennium: i) a more equitable access to knowledge (by improving education, strengthening of scientific and technological capacities, rendering efficient a global international network), ii) active generation of new knowledge (by supporting fundamental research, coupling local and national institutions in co-operative systems and networks, intensifying co-operation between academies, universities, governments and the private sector, integrating sector knowledge in interdisciplinary research movements), iii) application of the value system of the scientific and technical community with a view to a lasting development. Within the European Union, some priorities are synthesized in the paper "Technology Map", drawn up by the Institute of Prospective Technological Studies, referring to a few domains such as: information technologies and communications, life sciences, energy, technologies of ecological production, transports.



Towards an Education, Research and Innovation Integrated Network in Micro-and Nanotechnologies

Prof. Dan Dascalescu, Member of the Romanian Academy, General Manager of the National Institute for Research and Development in Microtechnologies

(presented in page7)

"The National Space Program, Intergration of Romania in the European Space Agency- an Open Market for Exporting High Technology"

Dr. Cosmonaut Dumitru Prunariu, President of the Romanian Space Agency

Dr. phys. Marius Ioan Piso, Executive Manager, Vice-President of the Romanian Space Agency



It is presented the National Space Program, in its main points, as a continuation of the Romanian Space Agency Programs carried on in the period 1993-2000. Within the Governmental International Co-operations, it is dwelt upon the relation Romania -ESA, the existing co-operation agreements

cont. in page 5

Micro and Nanotechnologies: Between National Priorities and European Co-operation

Friday, February 16-th, 2001, Assembly Hall of the Romanian Academy 125 Victoria Road

cont. from page 4

and the new framework offered by the European agency with a view to a gradual integration of some East-European countries, such as Romania.

There are presented principles, strong and weak points of integration, offered opportunities, risks and threatenings about integration as a result of internal factors more or less controllable and Projects proposed for integration. Finally, it is presented the European Strategy for space technology, laying stress on the Micro-and nanotechnologies necessary for ESA, where Romania could adequately make its contribution.

"Advanced Research Trends Promoted in INCDFM, with an Impact in Micro- and Nanotechnologies and in Material Science"

Dr. Mihai Lazarescu, Deputy Scientific Manager of the National Institute for Research and Development in Material Physics.

These last three decades the research activity of the Institute of Physics-Bucharest has got a strong interdisciplinary nature and it has been directed both towards obtaining new materials, special structures and components and towards developing new improved techniques for characterizing their physical and chemical properties. The present endowment is one of the most performant in the country in the field of material research. The impact of the result of these researches on the micro-and nanotechnology field or on material science is already emphasized by the numerous forms of international scientific co-operation, within impressive programs such as NATO, COST, the Fifth Framework, DFG or under the form of over 40 bilateral co-operations with powerful institutes or famous universities, from abroad. The investigated domains comprise issues of microsensors, intermetallic semiconductor structures, fullerene structures, carbon nanotubes, nanometric magnetic crystalline phases, piezoceramic micromotors oxide materials etc.

"Opportunities of Integrating Multidisciplinary Research in National and International Programs"

Dr. Ion Morjan- Deputy scientific manager of the National Institute for Research and Development in Laser, Plasma and Radiation Physics.

Within the National Institute for Research and Development in Laser, Plasma and Radiation Physics (INCDFLPR), having as a main object of activity to perform fundamental and applied researches, technological development in the fields of laser physics, plasma physics, accelerated beam physics, solid state quantic electronics, as well as space physics, there have been developed researches leading to the obtaining of a nanomaterial and nanostructured material range with a real potential of application in micro-and nanotechnologies. Having in view the development and reevaluation tendencies of micro- and nanotechnologies which make themselves conspicuous in the world, as well as the interest shown by research institutes in the country or from abroad, we considered the support and participation in the National Program for Micro-and Nanotechnologies convenient and benefic. To carry out the objectives of the National Program as concerns the setting up of a structure of research institutes and groups network constitutes a stimulating and catalyzing factor of efforts for working out projects in common. This structure will also be the basis for a successful approach of researches within the European programs (the Fifth Framework Program, NATO, PHARE, EUREKA etc).

"Perspectives of European Co-operation in the Field of Nanosciences and Nanotechnologies"

Dr. Ladislav Vekas, Centre of Fundamental and Advanced Technical Researches, Timisoara
Subsidiary of the Romanian Academy.

The present paper refers to the following main issues: to define the "nanosciences- nanotechnologies" field; nanosciences- nanotechnologies, a new revolution in science and technology, examples, main directions and the technological impact at present and in the offing; a comparison drawn among the activities in this field carried on in Europe, Japan and USA and the fundamental problems of researches under development in various countries; the main objectives of researches, priority directions (nanoelectronics, nanobiotechnologies); the present situation in Europe and the role played by the NanoSTAG consultative group of DG XII-EC-Brussels in carrying out a strategy at EC level, to provide competitiveness of the European countries in the field of nanosciences-nanotechnologies.



"Nanomaterials and Devices for Recognizing and Eliminating Pollutant Agents to Monitor and Protect the Environment"

Prof. dr. Aurelia Meghea, National Centre for Consulting
Regarding Environment Protection within the University Politehnica"- Bucharest

At a European level, there are concerns of applying and diversifying the sol-gel procedures in research centres of prestige in France (University Montpellier, University Marie-Curie-Paris), Great Britain (University Sheffield), Sweden (Royal University Stockholm), Portugal (University Lisbon), and in the field of nanocomposite materials intended to improve life and environment quality, researches have but an incipient character. The investigation initiated in the year 2000 by the UPB-CNC team in co-operation with the Institute of Physical Chemistry belonging to the Romanian Academy and the Research Institute for Non-Ferrous and Rare Metals had in view the synthesis and characterization of new nanocomposite materials obtained through the sol-gel method in order to obtain absorbent films and materials meant to eliminate pollutant agents. To this effect, we have in view the manufacturing of two types of materials referring to nanometrically disseminated species in the oxidic or hybrid matrix: ferrite nanomaterials for magnetically intensified absorption of heavy and radioactive metals and the nanometric inclusion of fullerenes for separating organic pollutant agents (PAH, PCB, etc).

Advanced Materials for Micro-and Nanotechnologies"

Dr. eng. Wilhelm Kappel, Scientific Secretary of the Research and Design Institute for Electrochemical Engineering, Head of the Centre for Advanced Research.

The progress of these last years in the field of materi-

als causes diversification of micro-and nanotechnologies. There are today advanced materials directly intended for micro-and nanotechnologies.

Beyond the competitiveness of products resulted from the two domains - Advanced Materials and Micro-and Nanotechnologies - they have a mutual advantage rendering them attractive in point of investors: relatively small investments with profits comparable to those of large-scale industry.

"Functionalized Nanoparticles and Nanostructures with Selective Properties Used in Ecologic Impact Separations"

Dr. Georgeta Popescu, Dr. Ana -Mariana Urmenyi,
Dr. Bujor Gabriel Albu, Cristina Maruta, Laura Buhoci,
Ioana Viezure, Marius Sandru
Centre of Research for Micromolecular Materials and Membranes SA
Dr. Constantin Grigoriu, Dr. Gheorghe Dinescu
National Institute for Laser, Plasma and Radiation Physics.

Dr. Cornelia Luca- Institute of Macromolecular Chemistry "Petru Poni"

Modern technologies are directed towards achieving ecological natured technological flows, where every by-product resulted following the process is recovered and reused in the flow.

Moreover, the world research tends to implement some preparation techniques with very high returns and to obtain reusable by-products. An example is the development of combustion electrochemical cells where the main product is power and the by-product is water. The nanostructural disposing of these materials confers selectivity and in the chemical field, specificity to some chemical reactions.

The paper aims at obtaining functionalized nanoparticles and nanostructures with selective properties that can be used within a technological flow or before reintroducing effluents in the existing ecosystem. Up to now, we have succeeded in obtaining silica nanoparticles with pre-established dimensions, polymeric nanoporous microparticles with reactive groups, microporous ceramic materials on which nickel metallic nanoparticles, being able to act in catalytic reactions, have been deposited through plasma techniques.

"Implications of Polymers in Microtechnology"

Dr. Virgil Barboiu, Institute of Macromolecular Chemistry, "Petru Poni" Iasi

The paper surveys types of polymers with applications in microtechnologies, in general, and in microelectronics in particular. Special attention is paid to electrically and optically active polymers, which can be used in new electronic devices and in sensors. The results obtained by the Institute "Petru Poni" in the field of polymeric materials are presented. As a conclusion, we can maintain that organic materials find their utilization in micro- and nanotechnologies intended to informatics, sensors and microelectronics.

"Nanostructures for Pollution Control in Liquid Media", Dr. Irina Kleps, Anca Angelescu, Mihaela Miu
National Institute for Research and Development in Microtechnologies, Bucharest, Dr. Stela Pruneanu, Dr. Gheorghe Mihailescu, National Institute for Research in Isotopic and Molecular Technology, Cluj Napoca - it was awarded with the golden medal at the Salon International des Inventions, Genève, April 4, 2001. This paper will be presented in the next issue

"Micromachined Components for Microwave and Millimetric Wave Communications", Dr. Alexandru Muller, Head of Laboratory in the National Institute for Research and Development in Microtechnologies Bucharest (see page 12).

"Micro-and Nanotechnologies: between National Priorities and European Co-operation"

February 16th, 2001

Discussion Papers (topics suggested for debates)

1. Evolution of scientific research in the European Union (and in the world)

The European Union finds that the investments in science are too small, that the efforts on a national plan are not correlated by a "European policy" in the field, that it does not know to efficiently use the results of researches in economy, that it suffers from a human resource deficit which is about to worsen. All these lead to a decrease of the European competitiveness on the plan of advanced technologies and economy, in general. Within a declaration-programme starting from Europe's ambition to reach, in a ten-year period, the first place in the world in the new "knowledge based" economy (Lisbon, March 2000, Declaration of EU Presidency) a complex of measures is proposed including education and research. One of the measures is related to the creation of the "European research area", implying a much more efficient co-operation, at a European level, in using human and material resources existing in various countries.

As concerns the evolution of RD programmes funded by the European Commission, it can be noted that;

a) In the Fifth Framework Programme some traditional research domains have not been visible any more as such, four large areas of issues in multidisciplinary research being defined;

b) The multidisciplinary and interdisciplinary research is expected to have a far greater share in the Sixth Framework Programme, with the information society technologies playing an integrating part both at an information level (through information processing and knowledge management), and at a materializing level (with micro-and nanotechnologies playing an essential part);

c) The proposals for the future are in favour of scientific service centres (great facilities), research networks, electronic communication and "virtual" units (laboratories, centres, institutes).

What should Romania do in this context? We think that human and material resources should be carefully evaluated in their dynamics and in comparison with the present situation in the world. Options should be made in the institutional system (see the research law) and in the priority attached to domains. Realities and possibilities must amend wishes. Research in the fundamental domains cannot be abandoned (also being the condition of a first-class higher education) but it must be directed towards the multidisciplinary issues with a strong, applied potential (it is also the case, especially, of micro-and nanotechnologies).

2. Participation of Romanian researches in international advanced research programmes

This taking part must be illustrated within the seminar with concrete examples. It raises the problem to what extent the participation of Romanian researches corresponds to a real progress in the Romanian research units, including through the creation of partnerships, opening of new research fronts and application ranges.

How could be stimulated Romania's participation in advanced researches, so that this situation might not be considered as a factor of accelerating competence emigration?

Undoubtedly, if Romania also had advanced research centres (enjoying a powerful endowment, financing by national programmes and a corresponding management), then there would be conditions to limit emigration.

To attract young people is especially critical, because those who have a motivation for science will choose advanced issues, allowing them to make quite a scientific career. Those who are abroad for training have an additional reason not to come back in the country if they do not find here sufficiently interesting concerns, advanced endowments, and current possibilities to maintain international co-operations.

The participants in the seminar will probably agree that in point of "brain drain" the situation of Romania is more and more difficult and the process of accession to EU as such is liable to improve situation on a medium and short time period. Often in real situations, the main "west" motivation for contacts and co-operations is given by the possibility of recruiting labour personnel from the "EST".

4. Integrated activities of education, research, innovation

Within the seminar the proposal of setting up the Integrated Network of Education, Research and Innovation for Micro-and Nanotechnologies will be launched. The already existing research network MICRONANOTECH would form the nucleus.

The aim is to intensify the education and research effort on a direction that is considered to be very promising in the world, efficiently using the already existing human and material resources and attracting various financing sources. The objectives of the network would be:

- multidisciplinary training of personnel and providing instruction in the new technologies;
- facilitating the access to the material base existing in the country through partnerships among the network members;
- developing in co-operation of new scientific and technological services;
- drawing up new education and research projects;
- stimulating technological transfer and providing designing and technological services for innovating SMEs.

3. Access to high technology services and support for the development of the new industries

Within the seminar it will be demonstrated, using concrete examples, the fact that "microtechnologies" (microelectronics included) benefit, in Western Europe, by a system of high technology service centres which is also accessible to Romania. For

instance, within the far-reaching project EUROPRACTICE, both consortia providing technological services and competence centres capable of lending assistance in product designing are created and funded. In microelectronics, the delivery of high complexity designing software at extremely low costs is provided and the physical realization of integrated circuits at the prototype level is subsidized. In this way "school" projects can be worked out benefiting by the most modern technology, in facilities built with investments of a thousand million dollars. The use of a (custom) specialized integrated circuit in a product may open a market niche (intelligent, miniaturized devices).

Moreover, certain technological centres benefit by financing from the European Commission to physically realize selected projects, also providing funding for the stay of specialists who have designed them and pilot their putting into execution.

The utilization of new technologies and the consolidation of examination are liable to facilitate investments in the field and the development of innovating enterprises.

5. Towards defining national priorities in research-development

The seminar may occasion a debate related to some general problems of research in Romania (see item 1), but also the exemplification of some applications of research in micro-and nano-technologies (this time with a special accent on environment pollution problems).

Proposal for

The Integrated Network of Education, Research and Innovation in "Micro-and Nanotechnologies"

A survey of evolutions in scientific research recommends the strengthening of co-operation among various units and groups, as concerns education, research and innovation using a network structure. The rationale may be explained as follows.

Technology is based, to an ever-greater extent, **on science** and the scientific discoveries are more rapidly applied in practice.

The **multidisciplinary** character of research has become more prominent and the cycle education-research-innovation has been shortened and its stages are interdependent. As a result, we can speak about both **horizontal integration** (interaction of activities carried on in various disciplines) and **vertical integration** (among various types of activities such as: education/instruction, scientific research/technological development, and, respectively, technology transfer/ innovation). This integration appears both at the level of institutions and at the national or the international level. The **heterogeneous network** structure, in a permanent and rapid evolution, is the most adequate model, also supported by the new means of communication (in an explosive and unpredictable development), allowing the setting up of **virtual laboratories, centres and institutes**.

The suggested **"micro-and nanotechnologies" network** mainly aims at training specialists and using them, to an ever greater extent, for research, technological development and innovation carried on in the country, as well as for integrating these activities in an international, European and regional context. The network already exists in Romania, in an incipient form, as a research network.

An extension of the existing network is suggested. It will be used also in education and in the technological development and innovation, with the support of the Ministry of Education and Research, and perhaps of the Ministry of Industry and Resources, the Ministry of Communications and Information technology, the Ministry of Small and Medium-Sized Enterprises (SME) but also of professional associations, the Chamber of Commerce and Industry and private enterprises. **Such a network can be rapidly and efficiently integrated in the European and international activities.** It is compatible with the ideas underlying the "European research area", a concept officially launched, at the European Commission's proposal, by the European Presidency Conclusions (Lisbon, March 2000).

A. The essential ideas in the background of the proposal for an integrated network of education, research and innovation in micro-and nanotechnologies are:

- 1) **Human resources** represent a key factor in the development and a limiting resource even for developed countries.
 - 2) Training and maintaining in the country (at least in part) of **specialists in advanced research and high technologies** would represent an advantage for Romania from three points of view: a) attractiveness for international scientific co-operation in general and European co-operation in particular; b) means of promoting foreign investments in advanced technology; c) opening of access for small and medium sized to advanced technology both in the country and abroad.
 - 3) The **"micro-and nanotechnology" domain** has a huge potential both for scientific research and for technological innovation. This domain is important for sustainable development, energy saving, life and environment quality, and also for the "ambient intelligence".
 - 4) Romania already has a potential in the field. Due to international co-operation and the possible access to technological services, **the activities in this domain are not conditioned by massive investments** in this country.
 - 5) Romania may organize the activities in the field according to the most advanced models already existing in the developed countries, with a **"vertical" integration**, by combining training, scientific research and innovation activities. This integration will provide favorable conditions for: a) accelerating research; b) attracting private funds for education and research activities; c) developing international co-operations.
 - 6) We consider that, at this moment, the most adequate approach of the above - mentioned issue is in a **network structure, allowing information exchange and catalysing activities on specific domains** (strengthening of partnerships and setting up of consortia to work out new projects).
- There already exists a possible nucleus of this integrated network: the research network for micro-and nanotechnologies, MICRONANOTECH.

B. MICRONANOTECH: setting up and evolution of the network.

- The nucleus of the network was set up in the year 2000 from the units belonging to the research consortia having contracted the multidisciplinary objectives from the programme "Horizon 2000". The National Institute for Research and Development in Microtechnologies coordinates the two consortia.
- At the beginning of the year 2000, the MICRONANOTECH network was recognized as such by the European Commission, in an inventory of activities in the nanotechnology field.
- At the end of the year 2000, the section of "Micro-and Nanoscience and Engineering" of the ROMINFOR association was set up, calling around most units and groups in the country acting in the domain. These members of the Association represent the extension basis of the MICRONANOTECH network in the near future.

Examples of Possible Activities

- Multidisciplinary education (training through university, doctoral and post university studies) with finalization through accredited institutions.
- Continuous education: finalization through accredited centres
- Distance education (e-learning)
- Education by research (projects), for instance "training by research in microelectronics" (activity promoted by the European Commission)
- Combining the research activity with scientific, technological and design service activity.

Examples of Real Measures (activity plan)

- Investigation regarding the domain evolution on a world scale
- Inventory of existing activities in education (lectures, training for a doctor's degree etc) and results obtained in research
- Inventory of the domain potential in our country (human and material resources)
- Setting up a network of groups and laboratories from various institutions in the country
- Intensification of international co-operations by organizing promotional, scientific events and educational activities, specialist exchanges, access to external technological resources.

C. Content of the Activity of the Integrated Network: Examples of Proposed Actions

The essential function of the network is to provide **communication** through dissemination of information and transparency of activities. Every networking partner (node) can open himself to the exterior according to his own interest.

The communication plays an essential role in the new, knowledge - based economy.

Every node has a definite functionality (offers and requires certain types of services).

Communication (preceding co-operation) is performed both on a "horizontal plane" (for instance among variously profiled education units), and on a "vertical plane" (among units working at various "levels", for instance among faculties, research centres, innovative companies).

This integration process may also take place within an institution, but it is especially benefic at the local, national, regional, pan-European, and global levels.

Supplementary functions can be provided in certain "sub networks", for instance in a research laboratory network a mutual access to equipment is provided. This is a means of counteracting the limited character of human and material resources.

In a partnership between a research centre and a production and services company, the mutual access to know-how can be provided, considerably accelerating the innovation process.

The time factor is also essential: the sub networks dedicated to certain projects can be rapidly formed, having in view resource complementarity, entering into competition for funding, scientific priority, technology transfer.

Anticipated Results (with application in the micro-and nanotechnology field)

- Realization of a "vertical integration", by combining multidisciplinary education, research and innovation processes, as an experiment and an anticipation of a knowledge-based society and economy.
- Development of education and research in a strongly multidisciplinary domain and with a great perspective in numerous applications (bio-medical and environment protection, included)
- Increasing the number of Romanian specialists from various generations acting in the field of "micro-and nanotechnologies"
- Strengthening of international exchanges and participation in the "European research area"
- Setting up of a centre of interest on a regional plane providing commercial-based services (training included) etc.

better used. The present means of electronic communication support this network co-operation.

The network will carry on an activity on a national scale and at the same time it will be open to international co-operation, playing a part on a regional plane.

Dan Dascalu

Note: The proposal (presented in the scientific seminar at the Romanian Academy, on 16th February, 2001) was first discussed within a meeting of the Commission for Microsystem Science and Technology, with the members of the Commission for "Micro-and Nanotechnologies" belonging to the Consultative Board for Research, Development and Innovation of the Ministry of Education and Research.

GROUP "STRUCTURE OF NANOMATERIALS" National Institute of Materials Physics, Lab. 150, Bucharest

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Drd. Monica Tanase (present address: John Hopkins University, Baltimore MD, USA)
Drd. Iacob Totolici (present address: Univ. of Salford, UK)
Drd. Oana Malis (present address: Cornell Univ., USA)
Drd. Doinita Mihai-Popescu (present address: Lab. for Surface Sci&Technol., Univ. of Maine, Sawyer Research Center, Orono ME, USA)

The research team also participates in the IDRANAP European Center of Excellence (INFIN - Bucharest), where it coordinates Work Package 11 "Nanomaterials".

Mission:

Structure of nano-solids. Relation structure - physical properties

Activities:

Structure investigations by X-ray diffraction (XRD), X-ray absorption (EXAFS/XANES) and emission (XES) spectroscopies

Main equipment:

- X-ray diffractometric unit DRON 2 (on-line, monochromators)
- Access at synchrotron radiation sources (international projects) for EXAFS/XANES, NRXRD
- Equipment for controlled vacuum deposition of thin films

Main partners:

National:

National Institute for Research and Development for Lasers, Plasma and Radiation
Research Center for Applied and Theoretical Physical-Chemistry

International:

Research Institute for Technical Physics and Materials Science - Budapest
Laboratoire pour l'Utilisation du Rayonnement Electromagnetique (LURE) - Paris
Laboratoire de Chimie Physique et Reactivite, Univ. Paris 6
Beijing Synchrotron Radiation Facility-Beijing

Current projects:

- Structure and local configurations in metal-fullerene thin film nanosystems. Evidence for interface interactions.
- Nano-icosahedral phases in Al-based alloys: structure, microstructure, local configurations, magnetic interactions.
- Nitride/carbide-based hard coatings: structure, strain-stress, texture, defects as related to mechanical and tribological properties (5th Framework Program NANOCOMP 2001 -).
- Conducting polymers - C60 nanocomposites (COST Program 527 "Plasma-derived polymers" 2001 -).

Recent main results published in:

- R. Popescu, D. Macovei, A. Devenyi, R. Manaila, P.B. Barna, A. Kovacs, J.L. Labar "Metal clusters in metal/C60 thin films nanosystems", Eur. Phys. J. B 13 (2000) 737
- R. Popescu, D. Macovei, A. Devenyi, R. Manaila "Metal-C60 interface interaction: structure and energetical stability", Mater. Sci. Forum 321-324 (2000) 554
- R. Manaila, R. Popescu, A. Jianu, M. Constantin, A. Devenyi "Icosahedral nanophases in the Al-Mn-Ce system" J. Mater. Res. 15, 1 (2000) 56
- R. Manaila, R. Popescu, A. Jianu, A. Devenyi "Icosahedral nanophases in the Al-Mn-Ce system", Mater. Sci. Forum 321-324 (2000) 682
- F. Zavaliche, R. Manaila, R. Haberkern, P. Haussler, S.J. Poon, A. Belu-Marian, A. Devenyi "Conduction mechanism in some icosahedral and amorphous phases", Phys. Stat. Sol. (b) 218 (2000) 485
- P.B. Barna, M. Adamik, J. Labar, L. Kover, J. Toth, A. Devenyi, R. Manaila "Formation of polycrystalline and microcrystalline composite thin films by codeposition and surface chemical reaction" Surf. Coat. Technol. 125 (2000) 682
- R. Popescu, P.B. Barna, M. Constantin, A. Devenyi, R. Manaila "Icosahedral Al-Mn phases grown in diffusion-limited conditions" Thin Solid Films 360 (2000) 46
- R. Manaila, D. Biro, A. Devenyi, C. Giusca, P.B. Barna "(Ti1-xAlx)N coatings with multilayer structure: composition and elastic strain by X-ray diffraction" Proc. 3rd COST 516 Tribology Symposium, Eibar (Spain), May 2000, p. 169
- R. Manaila "Metastable metallic alloys" (invited review paper) Phys. Stat. Sol. (a) 176 (1999) 801-834

Past events

"Particle 2001", 24-27 February 2001, Rosen Center Hotel, Orlando, Florida, USA

Between 24-27 February 2001, at Rosen Center Hotel, Orlando, Florida, USA, the "Particle 2001" Conference was organized. The conference was co-sponsored by The Division of Colloid and Surface Chemistry of the American Chemical Society, The Particle Technology Forum of the American Institute of Chemical Engineers, The International Fine Particle Research Institute. Additional support was offered by Army Research Office, Dekker Foundation, EM Industries, Nanophase Technologies Corporation, National Science Foundation, NEC Research Institute, Petroleum Research Foundation, Strider Research Corporation.

The conference represented an important international scientific meeting focused on particle formation, particle characterization and particle-based materials synthesis. Application areas span chemical analysis, imaging, printing, pharmaceuticals, coatings, membranes, filters, composites, catalyst, electronics and optics.

More than 530 scientists attended the conference, among them about 250 were speakers and poster presenters of the 360 scientific papers included in the program.

Plenary Speakers were: Bob Langer (Massachusetts Institute of Technology-USA) - "Smart Particle for Drug Delivery", Markus Antonietti (Max-Planck Institute, Golm-Germany) - "Structured Nanocomposites: The Use of Polymers to Shape, Mold, Handle and Connect Inorganic Nanostructures" and Arjun Yodh (University of Pennsylvania-USA) - "Entropically Driven Self-Assembly and Interaction in Suspension".

According to their topics, the papers presented at the conference were included in the following 26 sections: Nanoparticle Synthesis, Particles by Polymerization, Nanopowder Synthesis and Applications, Morphology Control in Precipitation and Condensation, Flocculation and Stabilization, Rheology of Dispersions and Suspensions, Emulsion Technology - Tribute to Paul Becher, Condensation in Homogeneous and Porous Media, Particle Based Mesoporous Materials, Particle Based Optical Materials, Composites, Mechanochemical Synthesis and Communion Processing, Surface Modification, Self-Assembled Films, Particles in Layer-by-Layer Assembly, Colloidal Crystallization and Assembly, Powder Characterization, Optical and Electronic Characterization of Particles, Surface and Film Characterization, Ensemble Characterization, Electrokinetics, Nanodelivery - Liposomes and Particles, Particle in Separations, Single Particle Sensing, Particle Arrays, Electronic Materials.

Most of the attendees were from USA, but participants from other 22 countries as, Germany, UK, Japan, Italy, Sweden, Switzerland, Israel, Netherlands, Australia, Mexico, Venezuela, etc. took part in the conference.

The scientists who attended the Conference represented prestigious universities, research institutes and companies. Among the Universities one may mention, Massachusetts Institute of Technology-USA, University of California at Berkeley-USA, Pennsylvania State University-USA, Tokyo Institute of Technology, Japan, Royal

Institute of Technology, Sweden and so on. The most important research laboratories were, Oak Ridge National Laboratory-USA, Sandia National Laboratories USA, Max-Planck Institute, Golm-Germany, et al, while among the companies one may count: BASF AG Germany, The Dow Chemical Corporation-USA, Nanophase Technologies Corporation-USA, DuPont Microcircuit Materials-USA, Eastman Kodak Company-USA, so on.

From the Institute of Physical Chemistry "I.G.Murgulescu" of Romanian Academy, Bucharest, Dr. Maria Zaharescu attended the conference and presented three papers in the field of nanopowders and nanocomposites obtained by sol-gel method.

The paper, "Sintering ability of the sol-gel nanopowders in the $\text{Al}_2\text{O}_3\text{-TiO}_2$ system", by Maria Zaharescu, Joanna Groza, Lia Stanciu, Vladimir Kodash (oral presentation), represented a collaboration with the University of California at Davis, supported by National Science Foundation, USA.

The paper, "Sol-gel mono- and polycomponent nano-sized powders in the $\text{Al}_2\text{O}_3\text{-TiO}_2\text{-SiO}_2\text{-MgO}$ system" by Maria Crisan, Andrei Jitianu, Maria Zaharescu, Fujio Mizukami, Shu-ichi Niwa (poster) presented the results obtained by a friendly collaboration with National Institute of Materials and Chemical Research, Tsukuba, Japan.

The paper, "Crystallization of nano-sized Fe_2O_3 in the $\text{SiO}_2\text{-Fe}_2\text{O}_3$ system, obtained by sol-gel method", by Andrei Jitianu, Maria Crisan, Maria Zaharescu, Ileana Rau, Aurelia Meghea (poster) was realized in collaboration with "Politehnica" University of Bucharest, Romania, Faculty of Industrial Chemistry.

The Romanian contributions to the conference were appreciated by several scientists that proposed scientific and technological collaboration with the Romanian team. Also, Ph.D. and postdoctoral scholarships were offered to the young scientist from the Romanian team.

The papers presented at the conference will be published in special issues of the Journal of Dispersion Science and Technology.

During the conference 18 prestigious exhibitors presented their equipments devoted to particles characterization. Most of them were from USA as, Beckman Coulter, Inc, Micromeritics, Nanoscale Materials, Inc, Particle Sizing Systems and so on, but Whitehouse Scientific from UK, and Molecular Science from Australia were present, as well.

The Organizing Committee appreciated that the "Particles 2001" was "an unequalled success". The next conference, "Particle 2002", will be organized coming spring and will be dedicated to "Particles in Medicine, Pharmaceuticals and Drug Delivery".

Dr. Maria Zaharescu
Institute of Physical Chemistry "I.G.Murgulescu"
Romanian Academy

National Fair of the Romanian Science and Innovation - SIR 2000 (Bucharest, December 2000)

The domain of Micro and Nanotechnologies was defined by at least 50 posters, were the results obtained by the major Romanian "actors" in the field (*National Institute for Research and Development in Microtechnology, National Institute for Research and Development in Physics of Materials, National Institute for Laser, Plasma and Radiation Physics, Research Centre for Macromolecular Materials and Membranes, "Petru Poni" Institute of Macromolecular Chemistry Iasi, Technical University Iasi*) were presented, grouped on the following main chapters:

- Definition of the domain: Micro and nanotechnologies - a new philosophy for the technology of the future
- Projects in the frame of the National Programme "Horizon 2000" (New general objectives launched in 2000)
- Projects in the frame of the National Research and Development Programmes "Relansin" and "Calist"
- Grants of the National Agency for Science, Technology and Innovation and of the Romanian Academy
- International research co-operation projects (Framework Programmes IV and V, NATO, Bilateral Agreements)
- Facilities available in the Romanian Institutes
- International and National Conferences organised in Romania.



Ion Iliescu - President of Romania (left), Ecaterina Andronescu - Minister of Education and Research (center), Prof. Dan Dascalu (right)

Prof. Dan Dascalu, General Manager of the National Institute for Research and Development in Microtechnology explains to the President of Romania, Ion Iliescu, the main issues of the Micro- and Nanotechnology field.

CAS 2001 - Second CALL FOR PAPERS



TOPICS

Contributions in solid-state devices and (sub)systems were called in the following domains.

• Semiconductor device physics and technology

device modelling and simulation, silicon and compound semiconductor devices, heterostructures, advanced materials and processes, reliability and defect engineering;

• Design and technology of microelectronic components

microelectronic, microphotonic and microwave integrated sub-systems, devices and modules for power control and conversion, specialized electronic circuits integrated in the microelectronic technology, testing and reliability;

• Simulation and fabrication of microstructures and microsystems

surface and bulk micromachining, microengineering techniques, electro-opto-mechanical microsystems, microsensor and actuator integration, signal processing, computational intelligence and system interfacing;

• Science and technology of nanostructures and nanostructured materials

composite nanoparticles and nanostructures with selective properties, nanostructures and nanostructured materials with special properties.

The CAS 2001 edition will have a special focus on the following areas:

• Devices for microwave and optical communication

• Micro and nanotechnologies for bio-medical applications

• Computer-aided simulation and design of micro-structures and microsystems

• Power semiconductor devices

INVITED SPEAKERS (announced till March, 30)

- **G.A.J. Amaratunga**, Cambridge University, United Kingdom
- **Pierre Blondy**, IRCOM Limoges, France (*Applications of RF MEMS to Tunable Filters and Matching Networks*)
- **Dan Cacuci**, Honorary Member of the Romanian Academy
- **Catherine Dehollian, M. Declercq**, Ecole Polytechnique Federale de Lausanne, LEG-DE, Switzerland (*A Global Survey on Short Range Low Power Wireless Data Transmission Architectures for ISM Applications*)
- **Alexandros Georgakilas**, FORTH, IESL, Greece (*Monolithic Integration of GaAs Optoelectronic Devices on Si Using GaAs/Si Low Temperature Wafer Bonding*)
- **Jean-Charles Guibert**, LETI-CEA/Grenoble, France
- **Frans H.P.M. Habraken**, Universiteit Utrecht, Debye Institute, The Netherlands
- **Patrick V. Kelly**, NMRC- Ireland's ICT Research Centre, Ireland
- **Jose Millan**, CNM/Instituto de Microelectronica de Barcelona, Spain
- **Robert Plana**, LAAS-CNRS, Toulouse, France (*MEMS Technology as a Contender for the Future Wireless Applications*)
- **Mihail C. Roco**, National Science Foundation, USA (*Worldwide Trends in Nanoscience and Nanotechnology*)
- **Thomas J. Sommer**, European Commission, Information Society Directorate-General, Brussels, Belgium

DEADLINES - CAS 2001 program

April 15th, 2001 - Submission of the contributed and invited papers.

June 15th, 2001 - Notification of the final acceptance of the contributed papers.

CAS 2001 workshops (including the Satellite Event)

April 25th, 2001 - Submission of the one page abstract and invited papers.

May 10th, 2001 - Notification of the acceptance of the contributions.

June 15th, 2001 - Submission of the full length papers (contributed and invited).

Satellite Event of CAS

The third International MEM-SWAVE Workshop, on "Micromachined Circuits for Microwave and Millimetre Waves" will be organized on 9th of October 2001, in the same place. The papers presented at the workshop will be published in a special issue of the "Romanian Journal for the Information Science and Technology".

CAS 2001 Workshops

A number of distinct Sections, grouped in a few workshops, will be organized within CAS 2001:

- **SCIENCE AND TECHNOLOGY OF NANOSTRUCTURES**
- **MICRO AND NANOTECHNOLOGIES FOR BIOMEDICAL APPLICATIONS**
- **MICROPHOTONICS**, with a special emphasis on **OPTOELECTRONIC DEVICES FOR COMMUNICATIONS**
- **MICROSTRUCTURES AND MICROSYSTEMS FOR MICROWAVE AND MILLIMETER WAVE COMMUNICATIONS**.

Events:

April 23, 2001
MIIF 2001: Int'l MEMS/MST
Industry Forum organised by semi
www.semi.org/europa
Munich - Germany

April 23 - 28, 2001
MicroTechnology
Exhibition Hall 7
at Hannover Industrial Fair
www.hannovermesse.de
Hannover - Germany

April 24 - 26, 2001
SMT/Hybrid/Packaging 2001
Int'l Congress and Fair
www.mesago.de
Nuremberg - Germany

April 25 - 27, 2001
DTIP of MEMS/MOEMS
Int'l Conference on
CAD Design and Test
http://tima.imag.fr/Conferences/dtip2001
Cannes - France

May 08 - 10, 2001
SENSOR 2001 and TEST 2001
Int'l trade fairs and conferences
www.sensorfairs.de/Test2/A rah
1 d.htm
Nuremberg - Germany

May 14 - 17, 2001
3rd Int'l Conference Measurement 2001
www.um.savba.sk/meas2001
Smolenice Castle - Slovak Republic

May 14 - 17, 2001
NEPCON/Microelectronic

Shanghai 2001
Int'l trade fair
www.reedexpo.com
Shanghai - P.R. China

May 17 - 18, 2001
BioMEMS 2001
Int'l Congress on
Nanofabrication and Analytical
Techniques for Biomedical
Microsystem Applications
www.knowledgefoundation.com
Sunnyvale, CA - USA

May 21 - 22, 2001
Course: Micro Devices for Fluid Handling
www.eurotraining.net
www.fsrm.ch
Stockholm - Sweden

May 21 - 22, 2001
AMAA 2001, Advanced
Microsystems for Automotive
Applications Sth Int'l Conference
www.amaa.de
Berlin - Germany

May 22, 2001
Course: Commercial Impact of Microtechnology in Medical and Biomedical Apps.
www.eurotraining.net
Berlin - Germany

May 27, 2001
Course: Materials for Microdevices and Microsystems: Fabrication and Integration
www.eurotraining.net
Turin - Italy

May 27 - 31, 2001
euspen's 2nd Int'l Conference
and 3rd general meeting, with

half and full day tutorials on May
27 www.euspen.org
Turin - Italy

May 28-29, 2001
Design Tool Training Course MEMSCAP MEMS XPlorer
www.memscap.com
Berlin - Germany

May 30-June 01, 2001
Int'l Symposium on Microelectronic and MEMS Technologies
Sponsored by SPIE, the
Int'l Society for Optical
Engineering, and Scottish enterprises
www.spie.org/info/emm
Edinburgh - Scotland, UK

May 30 - June 01, 2001
IMAPS Europe 2001
13th European Microelectronics
and Packaging Conference and
Exhibition
http://perso.wanadoo.fr/imaps.fr
ance Strasbourg - France

June 05 - 08, 2001
IBC's EuroBiochips 2001
The Microarray & Microfluidics
Technology Congress,
contact:
babita.bahal@informa.com
Munich - Germany

June 10 - 14, 2001
Transducers'01 Eurosensors XV
11th Int'l Conference on
Solid State Sensors and
Actuators www.transducers01
.de
Munich - Germany

Jun 11 - 12, 2001
Workshop on Optical MEMS and Integrated Optics
http://hft.e-technik.uni-dortmund.de Dortmund - Germany

June 15, 2001
Course: Start-up Creation in the fields of Microsystems
www.eurotraining.net
www.fsrm.ch
Lausanne - Switzerland

June 18 - 19, 2001
Course: Microsensor Packaging
www.eurotraining.net
www.fsrm.ch
Dresden - Germany

June 25, 2001
Course: Microfluidics: Pipetting, Dispensing and Microarrays
www.eurotraining.net
www.fsrm.ch
Villingen - Germany

July 08 - 13, 2001
InterPACK'01
Int'l conference on packaging
of microelectronics, photonics,
microwave and MEMS
www.asme.org/conf/ipack01
Hawaii - USA

October 23 - 24, 2001
5th Chemnitz Conference
Microsystem Technology -
Micromechanics &
Microelectronics Submission
deadline: April 28, 2001
www.infotech.tu-chemnitz.de/~sse/ mst01
Chemnitz - Germany

Oct 28-30, 2001
IEEE-NANO 2001
The First IEEE Conference on
Nanotechnology
Abstracts due: May 31, 2001
www.mein.nag.oya-u.ac.jp/IEEE-NANO Maui,
Hawaii - USA

October 21 - 25, 2001
µTAS 2001
5th Int'l Conference on
Miniaturized Chemical and
Biochemical Analysis Systems
Deadline for abstracts: May 11,
2001
www.casss.org/tas2001
Monterey, CA - USA

NEXUS Calendar

For updated information on NEXUS meetings and events, please see www.nexus-emsto.com/event/s/nexuscal.html

May 2001
7 May
Meeting of User-Supplier Club 8 (CAD Tools) at DTIP, Cannes (F)

June 2001
14-15 May
NEXUS Steering Committee
Grenoble (F)

June 2001
4-5 June
Meeting of User-Supplier Club 2 (Medical & Pharmaceutical) at EuroBiochips, Munchen (D)

July 2001
7 May
Meeting of User-Supplier Club 7 (**Household Appliances**) at SENSOR 2001, Nurnberg (D)

August 2001
26 June
NEXUS Council
Paris (F)

ENVIRONMENTAL CONTROL BY MEANS A NEW GAS DETECTION PRINCIPLE: GAS SENSING BY METAL OXIDES HETERO-JUNCTIONS

Project acronym: GASMOH

Contract n°: ICA2-CT-2000-10041

Financial support: The Fifth Framework Programme of EU Commission, for shared-cost RTD projects

The coordinator: Dr. Pietro Siciliano, Istituto per lo Studio di Nuovi Materiali per l'Elettronica I.M.E/C.N.R., Lecce, ITALIA

The principal contractors:

- Dr. Nicolae Barsan, Institute of Physical and Theoretical Chemistry, University of Tübingen, GERMANIA
- Drd. Adelina Tomescu, National Institute for Research and Development in Materials Physics, INCDFM, Bucuresti - Magurele, ROMANIA
- Prof. Giorgio Sberveglieri, Istituto Nazionale di Fisica della Materia, University of Brescia, ITALIA
- Dr. Pavel Bogdanov, Scientific and Research Institute for Physical and Chemical Problems, University of Minsk, BELARUS
- Prof. Yuri Bubnov, Avangard-Microsensors, Sankt-Petersburg, RUSIA

Duration of the project: 01.12.2000 - 01.12.2003

Objectives of the project:

- Design of new or improved types of gas sensors, based on new sensing process, for monitoring indoor and ambient air quality

- To ensure the frame for the transfer of the sensor technology to manufacturers of CEEC/NIS partners, aiming at combining the knowledge of scientist from EU and CEEC/NIS.

Applications:

- Control of the ambient in- and outdoor air quality.

Potential users:

- Institutes and public institution heaving ecological activity.
- Home air quality control.



Gas mixing system for sensor testing (INCDFM)

DEVELOPMENT OF TECHNOLOGIES FOR DOPED MICROMETER SIZE CORUNDUM (Al_2O_3) MICROSPHERES FABRICATED IN AN INDUCTIVE RF ARGON PLASMA

Project coordinator:

National Institute for R&D in Electrochemistry and Condensed Matter (INCEMC) Timisoara

Name of project manager: Fiz. Novaconi Stefan

Participant institutions: INCEMCT

Starting date: 2000

Duration of the project: 3 years

Source of Financing: Horizon 2000: Basic sciences: physics, mathematics, biology and interdisciplinary research / Condensed matter physics and new materials

Objectives: Development of:

- ~ New materials for doped microspheres
- ~ New technology for microspheres production
- ~ High efficiency production of microspheres in inductive (rf) coupled plasma

Preliminary results:

- ~ Micrometer size corundum microspheres (5-20nm) with low dimensional dispersion
- ~ Mathematical model of microspheres formation in a thermal field



Applications

- ~ Microoptics components
- ~ Optical communications and interconnects

Publications

Politehnica University Timisoara Bulletin, 45(59)-1 (2000)

Conference proceedings:

The 3rd conference on cond. matter physics, Timisoara, Romania

RESEARCH TEAM (INCEMCT):

St. Novaconi (novaconi@icmct.uvt.ro), A. Farkas

MICRO- AND NANOSTRUCTURES WITH APPLICATION IN PHOTONICS, SOLAR ENERGY CONVERSION AND SENSOR TECHNOLOGY: OBTAINING BY COLLOIDAL ROUTES; CHARACTERIZATION

Project coordinator:

Condensed Matter Research Institute Timisoara (INCEMC Timisoara)

Name of project manager: Fiz. Terezia Nyari

Participant institutions: CMRI (INCEMC), UPT

Starting date: 2000

Duration of the project: 3 years

Source of Financing: Horizon 2000: Basic sciences: physics, mathematics, biology and interdisciplinary research / Condensed matter physics and new materials

Objectives:

- ~ An interdisciplinary approach of the colloidal routes (bottom-up) for obtaining micro- and nanostructures
- ~ New materials for photonics, solar energy conversion, and sensing applications
- ~ Modeling and simulation of nanosystems

Preliminary results:

- ~ Colloidal synthesis of $CuInS_2$
- ~ Software for the calculus of PBG width in photonic crystals

Applications

- ~ photonics
- ~ solar energy conversion
- ~ sensors

Publications

Romanian Reports in Physics, vol. 51, nrs. 7-10

Conference proceedings:

CAS 2000 - Sinaia, Romania.

RESEARCH TEAM (CMRI):

T. Nyari (nyarit@icmct.uvt.ro), Z. Szabada, N. Pricopi, L. Bordea, R. Turcin, M. Lazar

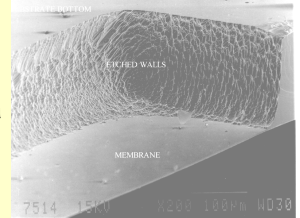
Micromachined circuits for microwave and millimeter wave applications "MEMSWAVE" INCO-COPERNICUS PROJECT 977131, 1998 - 2001

PROJECT MANAGER: Dr. Alexandru Müller, National Institute for Research and Development in Microtechnologies (IMT-Bucharest)

Period: October 1998 - October 2001

PARTNERS:

FORTH-IESL, Heraklion, Greece; ITC-IRST Trento, Italy; HAS-MFA, Budapest, Hungary; Uppsala University, Sweden; CNR-M2T - Microwave Microsystem Technology, Rome, Italy; Tor Vergata University, Rome, Italy; ISP-Kiev, Ukraine; Microsensors Ltd., Kiev, Ukraine.



SEM photo of the semiconductor membrane obtained by dry etching (RIE) (manufactured by FORTH-IESL HERAKLION in cooperation with IMT-Bucharest)

The main technical objectives of the Project are the following:

- manufacturing of dielectric membranes on silicon and $A_{III}B_V$ compound semiconductor substrates as support for microwave and millimeter wave circuits;
- design, modelling and manufacturing of microwave circuit elements on dielectric membranes grown on silicon and GaAs substrates;
- design, modelling and manufacturing of microwave circuit elements on $A_{III}B_V$ compound semiconductor micromachined membranes and 3D structures;
- design, modelling and manufacturing of micromachined millimeter wave filter structures on $SiO_2/Si_3N_4/SiO_2$ and GaAs/AlGaAs membranes;
- micromachined antennas for millimeter and submillimeter waves;
- $A_{III}B_V$ /silicon heterobonding for microwave and millimeter wave applications;
- design, modelling and manufacturing of a receiver module for 38 and 77GHz and a transmitter module for 38GHz.



1.a

(manufactured by FORTH-IESL HERAKLION in cooperation with IMT-Bucharest)



1.b

(manufactured by FORTH-IESL HERAKLION in cooperation with IMT-Bucharest)

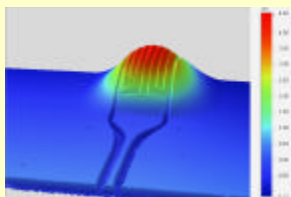


1.c

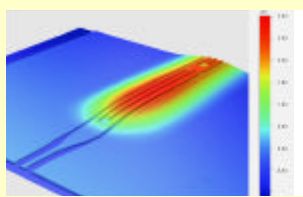


1.d

Design and mask fabrication - IMT-Bucharest and TOR VERGATA Univ.; technological processing - ITC-IRST Trento; measurements - CNR-M2T Rome and ICOM Limoges with the participation of IMT scientists

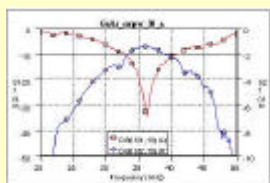


1.e

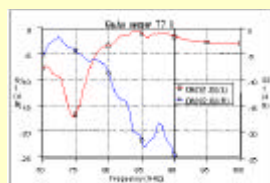


1.f

White Light Interferometry analysis performed at UPSALA Univ. of filters manufactured by FORTH-IESL HERAKLION in cooperation with IMT-Bucharest



2.a

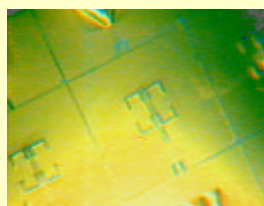


2.b

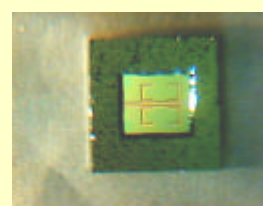
Measurements made at CNR-M2T Rome with the participation of IMT scientists

Main results - 2000:

- Band-pass filters for 38 (1.a, 1.c) and 77GHz (1.b, 1.d) manufactured on dielectric and semiconductor membranes on GaAs (1.a, 1.b) and high resistivity silicon (1.c, 1.d) substrates and White Light Interferometry analysis for the 38 (1.e) and 77GHz (1.f) filters manufactured on semiconductor membranes on GaAs substrate.
- Microwave measurements for 38 (2.a) and 77GHz (2.b) filters manufactured on semiconductor membranes (GaAs/AlGaAs) on GaAs substrate.
- Micromachined antennas manufactured on semiconductor membrane on GaAs substrate (3.a) and on dielectric membrane on silicon substrate (3.b).



3.a



3.b

Design, IMT and TOR VERGATA Univ. Rome; technological processes for silicon - ITC-IRST Trento; for GaAs - FORTH IESL HERAKLION; microwave measurements - CNR-M2T Rome

APPLICATIONS: This technology will develop a new generation of microwave and millimeter wave devices with applications in wireless communications (point to point systems and fixed stations), traffic management for vehicle (collision warning systems, information and traffic control systems), environmental monitoring, satellite communication systems.