YUGOSLAV MATERIALS RESEARCH SOCIETY
YU – MRS OFFICERS (1997-1999)

President: D.P. Uskokovi}

Vice Presidents: S.K. Milonji}, D.I. Rakovi}, V. Radmilovi}, B. Radonji}

Members: J. Nedeljkovi}, M. Davidovi}, M. Stevanovi}, N. Petranovi}, Dj. Drobnjak, S. Jovanovi}, Z. Popovi}, M. Plav{i}, A. Val~i}, S. Marinkovi}, A. Terlecki-Bari~evi}, Dj. Koruga, M. Vuk~evi} and M. Zlatanovi}

YUCOMAT II
SCIENTIFIC COMMITTEE:

Chairman:

- Dragan Uskokovi}

Vice-Chairmen:

- Slobodan Milonji}
- Velimir Radmilovi}
- Dejan Rakovi}

Members:

- Sne`ana Bo{kovi}
- Milorad Davidovi}
- Djordje Drobnjak
- Zoran Djuri}
- Slobodan Jovanovi}
- Djuro Koruga
- Slobodan Marinkovi}
- Tomislav Nenadovi}
- Miodrag Pavi}evi}
- Nade`da Petranovi}
- Milenko Plav{i}
- Zoran Popovi}
- Branislav Radonji}
- Endre Romhanji
- Mom~ilo Stevanovi}
- Ana Terlecki-Bari~evi}
- Magdalena Toma{evi}-^anovi}
- Andreja Val~i}
- Miodrag Zlatanovi}
- Ljiljana @ivkovi}

YUCOMAT II
ORGANISING COMMITTEE:

Chairman:

- Jovan Nedeljkovi}

Members:

- Obrad Aleksi}
- Radoslav Aleksi}
- Tomislav Grozdi}
- Vukoman Jokanovi}
- Mirjana Mitkov
- Pavle Pavlovi}
- Zlatko Rako~evi}
- Milivoje Tripkovi}
- Mira Vuk~evi}
- Nikola Vukeli}

Secretary:

- Predrag @ivanovi}

Adress: Yugoslav Materials Research Society
c/o Institute of Technical Sciences of the Serbian Academy of Sciences &Arts
Knez Mihailova 35/IV
P.O.Box 745
11000 Belgrade, Yugoslavia

Yugoslav Materials Research Society (Yu-MRS), a non profit scientific association founded in 1997, promotes multidisciplinary goal-oriented research on materials science and engineering. Its primary purpose is to hold symposia on materials research. Through these symposia Yu-MRS promotes interactions between chemists, physicists, ceramists, metallurgists, polymerists, engineers, etc., who are studying different aspects of a particular materials topic. Membership is open to anyone who has an interest in materials synthesis, processing, characterization and development.

Technical Editor of Proceedings: **Predrag @ivanovi}**

PREFACE

The Proceedings ADVANCED MATERIALS AND PROCESSES includes 49 papers presented at the Second Yugoslav Conference on Advanced Materials (Yu-MRS Meeting) held in Herceg Novi, Yugoslavia, September 15-19, 1997.

One hundred seventy scientists from Yugoslavia and abroad participated in the conference. From 143 papers 50 were presented orally and 93 as posters. All the submitted papers were reviewed by at least one of the members of the Scientific Committee and the accessory review team. The papers accepted for publication have been considered to be sufficiently original and to contain new data that deserve to be published in the Proceedings. Authors from 12 countries, except Yugoslavia, are included in the Proceedings, proving our international orientation.

Forty-nine papers selected by the Editors for inclusion in this volume are thematically pressented in nine sections: (1) Nanophase and Amorphous Materials; (2) Nonequilibrium Processing; (3) Fullerenes and Nanotubes; (4) Thin Films; (5) Ceramics; (6) Particulate Composites; (7) Carbon Materials and Polymer Composites; (8) Polymers; and (9) Physical Metallurgy**.**

The Editors wish to thank heartily to all members of the Scientific and Organising Committees for their efforts to organize the conference successfully, and to perform their duties as Session Chairmen and reviewers. Special thanks to Prof. F.E. Karasz (University of Massachusetts at Amherst, MA, USA), Dr. C. Loos-Neskovic, (C.E.N. Saclay Gif-sur-Yvette, France), Prof. P. Zannela (Institute of Chemistry, Inorganic Technologies and Advanced Materials, Padua, Italy), Prof. R.A. Andrievski (Institute of New Chemical Problems, Chernogolovka, Russia), Prof. V.D. Krstic (Queen's University, Kingston Ontario, Canada) as well as to domestic scientists for delivered plenary lectures which were very timely and informative.

Unfailing help and enthusiasm of Mr. Predrag @ivanovi}, secretary of the conference is gratefully acknowledged. The Editors wish to thank Predrag for his technical editing of the materials before, during and after the conference and for preparing Table of Contents, Author Index, Keyword Index, and other details for the Proceedings. Special thanks to Mrs. Verica Rogli}-Korica for her text language revisions.

Our gratitude to the Ministry of Development, Science and Environment of the Federal Republic of Yugoslavia, Ministry of Science and Technology of the Republic of Serbia, Ministry of Science and Education of the Republic of Montenegro, and other sponsors without whose support the Proceedings and the conference could never have been mounted.

Dragan P. Uskokovi}
Slobodan K. Milonji}
Belgrade, December, 1997 Dejan I. Rakovi}

Welcome Address by Dragan Uskokovi},
President of the Yugoslav Materials Research Society,
at the 2nd Yugoslav Conference on Advanced Materials
YUCOMAT II

Herceg Novi, Sept. 15, 1997

Ladies and Gentlemen, dear Friends,

I have the honour and great pleasure to address to you as the President of the Yugoslav Materials Research Society, probably the youngest society of the kind in the world, founded only a hundred days ago. Nevertheless, knowing that the oldest MR societies (American and E-MRS) are barely 15 years of age we may, with a good reason, say to have joined the MRS family relatively quickly. Although young, our society has already accounted a few notable achievements. First is the previous conference held two years ago when a decision was made to articulate all our activities through a society. The Conference Proceedings was published by Transtec Publications, Switzerland (ADVANCE MATERIALS FOR HIGH TECHNOLOGY APPLICATIONS, Mater. Sci. Forum, Vol. 214 (1996) 276) and is available in numerous libraries worldwide. About thirty papers therein represent worthily our research programs. It was a good starting point so that this second conference was included in the World MRS Conferences Calendar (MRS Bulletin, Vol. 22, May, 1997, No.5), proving our good orientation.

Let me take the opportunity to express some of the remarks of mine on the current situation in the field of materials science and engineering in general and in our country in particular as well as on the tasks and objectives of our Society. Last decade of this century, marked by clear orientation of industry towards high technologies, is a very difficult time for science, research and development. There are no visible indications on whether the great changes, occurred recently, are the signs of improvements, meaning a prelude to the coming century and controlled modeling of future, or a sign of a shift of significance from science to other fields of human activities. Science will remain, as it is, unstable until the mankind, taking into consideration real challenges, finds appropriate new ways out or adequate place for it. Industrial, therefore, rich countries although experiencing the crisis, which is practically global, have relatively easily maintained their stability.

Free market introduced into the East European countries contributed significantly to the confusion of political, economic and social changes. Countries of the former Soviet Union, artificially balanced owing to the military technology in the period of East-West bloc countries rivalry, had to face almost overnight the newly created situation and serious problems including a great number of scientists without programs and financial support and impossible reorientation of the very military technology.

The most difficult situation is, to our regret, here on this territory. The country which according to economic statistics belonged to the Central European countries in the beginning of the 1980s and at the door of the European Union, today is among the least developed ones, far beyond the former East European countries, which only a couple of years ago were a few times backward. Exhaustion as a consequence of war, drastic national income drop, “inner” and “outer” sanctions caused collapse of science and economy. As estimated, it will take us at

least 20 years to return to our previous positions, a tragic fact for us all and especially for new generations, that creative young people, whose dream to be professionally engaged in science will hardly come true.

It would have been ideal if the science had never been dependent on a financier. Of course, this is impossible and our intellectual and material discoveries are inevitably dependent on various sources. If these sources become limited, the scientific work will begin to stagnate, which means that the scientific programs must be financially supported but the global interests have to be considered closely and the moral integrity preserved.

The role of the materials science is to set new boarders, to extend within the discipline the region of the known. It is certainly a field of great intellectual challenge. Just remember the race for high-temperature superconductors of some ten years ago and recent fullerenes rush, crowned by Nobel prizes. Today, especially attractive fields are direct breakthrough into the world of atoms and their arrangements via high resolution methods and nanostructure designs; models applications and computer simulation at a large scale to predict the structure and properties of materials; and use of principles of self-organization of living organisms for synthesis and tailoring of materials structure at the molecular level (biomimicric materials).

All the time we have to be aware that the results of our activities achieved at institutes and universities are to speed up the application of high technologies in industry and that their validity has to be tested on the market. It is believed that, in the beginning of the century to come, only those industries, which are able to incorporate, quickly and successfully, new materials into their production processes will become competitive. Materials science, today, meets different but similarly important challenges such as:

- preserving of its basic mission in the range of fundamental science, i.e., shortening of the boundaries of the unknown,
- independent organization which is to make the science work efficient in defining aims to bridge the gap to industry,
- offering of innovations, competitive on the world market, to industry.

Answers to how to achieve all this, at least some of them, I hope will be found at three symposia and three round tables, the Society planned for this meeting. Within this frame we expect to come to the solutions of a series of problems of special interest to our country. Among them are the answers to:

- how to channel the scientific creativity of talented and successful scientists in order to develop fully their potentials,
- how to define the mechanisms to promote the highest quality programs and encourage the scientists; a suggestion is formation of centers of excellence where our top-level scientists may achieve the ultimate goals,
- how to overcome the interests of some small but powerful groups for whom their own interests are of primary importance,
- how to provide and direct financial support to be truly fruitful.

These are, certainly, the main objectives and tasks of the Yugoslav Materials Research Society we will focus on in the period to come.

I hope that deeply absorbed in the problems with high aims pursuing us to solve them, we will spend these five days in constructive and fruitful discussions, which are to result in new ideas, suggestions, and maybe new tasks for our Society.

I wish all the attendees a successful work. Pleasant stay in Herceg Novi is something that is understood, for this town always, due to its beauty, fascinating surroundings and our perfect hosts, creates an ideal atmosphere for spiritual rise and relaxation which we all need in a difficult time as this.