

I. MAMUZIĆ, President of Croatian Metallurgical Society

## Survey of 7<sup>th</sup> International Symposium of Croatian Metallurgical Society

# *S H M D* *'2006.*

“Materials and Metallurgy”

<http://pubwww.srce.hr/metalurg>

Šibenik 2006, June 18 - 22  
Solaris Holiday Resort, Croatia



Opening Ceremony of Symposium

**7<sup>th</sup> International Symposium of Croatian Metallurgical Society “Materials and Metallurgy” was held as a part of:**

- 55<sup>th</sup> anniversary of the foundation of Croatian Metallurgical Society (from Society of Engineers and Technician Steel Works Sisak 1952 y.);
- 45<sup>th</sup> anniversary of the foundation and publication of the Journal Metallurgy.

**At the 7<sup>th</sup> International Symposium of Croatian Metallurgical Society “Materials and Metallurgy” the following countries had participated:**

- |                           |                 |                           |
|---------------------------|-----------------|---------------------------|
| 1. Austria                | 13. Germany     | 24. Romania               |
| 2. Belgium                | 14. Hungary     | 25. Russia                |
| 3. Beloruss               | 15. India       | 26. Serbia and Montenegro |
| 4. Bosnia and Herzegovina | 16. Iran        | 27. Slovakia              |
| 5. Brasil                 | 17. Italy       | 28. Slovenia              |
| 6. Bulgaria               | 18. Japan       | 29. South Africa          |
| 7. China                  | 19. Korea       | 30. Spain                 |
| 8. Croatia                | 20. Lithuania   | 31. Sweden                |
| 9. Czech Republic         | 21. Netherlands | 32. Turkey                |
| 10. England               | 22. Poland      | 33. Ukraine               |
| 11. Egypt                 | 23. Portugal    | 34. USA                   |
| 12. France                |                 |                           |

**The aim of this Symposium is to point out  
all the possibilities of the materials and achievements in metallurgy.**

## ORGANIZER

CROATIAN METALLURGICAL SOCIETY (CMS)

## PATRONS

- European Steel Federation
- International Iron and Steel Institute
- Ministry of Science, Education and Sport Republic of Croatia,
- Croatian Chamber of Economy

## CO-ORGANIZERS

- Academy of Engineering Science of Ukraine
- University of Mining and Metallurgy, Faculty of Foundry Engineering, Krakow
- University of Ljubljana, Faculty of Natural Science and Engineering
- Baikov Institute of Metallurgy and Materials Science, Russian Academy of Sciences, Moscow, Russia
- University of Sarajevo, Faculty for Metallurgy and Materials Science, Zenica
- National Metallurgical Academy of Ukraine
- Technical University of Košice, Faculty of Metallurgy
- Technical University of Košice, Faculty of Mechanical Engineering
- Technical University of Košice, Berg Faculty
- University of Zagreb, Faculty of Mechanical Engineering and Naval Architecture
- University of Osijek, Faculty of Mechanical Engineering, Slavonski Brod
- University of Rijeka, Technical Faculty
- VŠB Technical University of Ostrava
- University of Split, Faculty of Electrical Engineering, Mechanical Engineering and Naval Architecture
- Institute of Metals and Technology, Ljubljana
- Institute of Materials Research of the Slovak Academy of Sciences in Košice
- Steel Works Split
- Moscow State Steel and Alloys Institute
- Physico-Technical Institute National Academie of Science Minsk
- Politehnica University of Bucharest
- Institute of Metallurgy "Kemal Kapetanović", Zenica
- Pisarenko Institute of Problems of Strength NASU, Kiev
- Dnepropetrovsk National University
- Iron Metallurgy, Prague
- Slovak University of Technology in Bratislava, Faculty of Materials Science and Technology

## CO-OPERATION WITH ORGANIZATIONS

- German Iron and Steel Institute (VDEh)
- ATS - Association Technique de la Siderurgie Francaise
- CENIM - Centro Nacional de Investigaciones Metalurgicas Spain

- ChSM - The Chinese Society for Metals China
- CRM - Centre de Recherches Metallurgiques Belgium
- Eisenhütte Österreich - The Austrian Society for Metallurgy
- Iron and Steel Society, USA
- ISIJ - The Iron and Steel Institute of Japan
- JERN - Jernkontoret, Sweden
- SRM Romanian Society for Metallurgy
- SITPH - Association of Polish Metallurgical Engineers
- HOOGOVENS The Netherlands
- SHS - Slovak Metallurgical Society
- Sociedade Portuguesa de Materiais
- MVAE - Association of Hungarian Steel Industry
- Steel Federation of the Czech Republic
- Union of Bulgarian Metallurgists
- IBS - Instituto Brasileiro de Siderurgia
- AIM - Associazione Italiana di Metallurgia
- The Japan Institute of Metals

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**TOPICS OF THE SYMPOSIUM WERE:**

**Materials**

- New Materials
- Refractory Materials
- The Development
- Applications
- Physical Metallurgy

**Metallurgy**

- Process Metallurgy and Foundry
- Plastic Processing of Metals and Alloys
- Technologies
- Energetics
- Ecology in Metallurgy
- Quality Assurance and Quality Management

There were 475 reports, 799 authors and coauthors registered for the seventh International Symposium of the Croatian Metallurgical Society.

250 participants were present at the symposium. Symposium activity took place through plenary lectures and four sections (poster):

Plenary lectures.....	12
Materials - Section "A".....	188
Process Metallurgy - Section "B".....	113
Plastic Processing - Section "C".....	69
Metallurgy and Related Topics - Section "D".....	93

For the plenary lectures research topics were selected relating partly to the new materials and partly to the increase of efficiency of metallurgical procedures, decrease of required energy as well as improving of products quality (Aluminium and High Strength Steels).

**PLENARY LECTURES WERE:**

**E. Mihok, P. Demeter, D. Baricová, K. Seilerová;** *Faculty of Metallurgy Technical University of Košice, Košice, Slovakia*

**Utilization of Ironmaking and Steelmaking Slags**

**W. Lehnert, R. Kawalla, D. Hübgen;** *Institut für Metallformung, TU Bergakademie Freiberg, Germany*

**Herstellung von Hochwertigen Bädern und Blechen aus Aluminiumwerkstoffen**

**M. Holtzer, J. Dańko;** *Faculty of Foundry Engineering University of Mining and Metallurgy, Cracow, Poland*

**The State of Art and Foresight of World's Casting Production**

**S. Dobatkin, J. Zrník, I. Mamuzić\*\*;** *Baikov Institute of Metallurgy and Materials Science, Russian Academy of Sciences, Moscow, Russia, \*COMTES FHT, Plzen, Czech*

*Republic, \*\*Faculty of Metallurgy University of Zagreb, Sisak, Croatia*

**Nanostructures by Severe Plastic**

**Deformation of Steels: Advantages and Problems**

**J. Zrník, I. Mamuzić\*, S. V. Dobatkin\*\*;** *Comtes FHT, Ltd., Plzen, Czech Republic, \*Faculty of Metallurgy University of Zagreb, Sisak, Croatia, \*\*Moscow Institute of Metallurgy and Materials Science, Russian Academy of Sciences, Moscow, Russia*

**Recent Progress in High Strength Low Carbon Steels**

**F. Vodopivec, M. Jenko, J. Vojvodič - Tuma;** *Institute of Metals and Technology, Ljubljana, Slovenia*

**Stability of**

**MC Carbide Particles Size in Creep Resisting Steels**

**O. Golovko, I. Mamuzić\*, O. Grydin;** *National Metallurgical Academy of Ukraine, Dnepropetrovsk, Ukraine, \*Faculty of Metallurgy University of Zagreb, Sisak, Croatia*

**Method for Pocket Die Design on the Base of Numerical Investigations of Aluminium Extrusion Process**

**Ya. V. Frolov, I. Mamuzić\*, V. N. Danchenko;** *National Metallurgical Academy of Ukraine, Dnepropetrovsk, Ukraine, \*Faculty of Metallurgy University of Zagreb, Sisak, Croatia*

**The Heat Conditions of the Cold Pilger Rolling**

Comprehensive outline of plenary reports (the 5 reports) were published in the journal *Metalurgija* 45 (2006) 3, 147-184 as the article, other 3 plenary report will be published in *Metalurgija* 45 (2006) 4. The summaries of all lectures of 7<sup>th</sup> Symposium were published also in *Metalurgija* 45 (2006) 3, 185-268.

Review of the lectures of Poster section were also published in the Journal *Metalurgija* 45 (2006) 3:

- **Review of the lectures of materials - section "A"**, *Metalurgija* 45 (2006) 3, 191-194;
- **Review of the lectures in process metallurgy - section "B"**, *Metalurgija* 45 (2006) 3, 221-224;
- **Review of the lectures of plastic processing - section "C"**, *Metalurgija* 45 (2006) 3, 239-241;
- **Review of the lectures of metallurgy and related topics - section "D"**, *Metalurgija* 45 (2006) 3, 253-255.

For this symposium the reports were prepared by the authors and coauthors from various world universities, institutes, academies and companies. It is to be emphasised that the scientists from three Croatian universities (Zagreb, Rijeka, Osijek) participated in the symposium.

In the time of 7<sup>th</sup> Symposium was also held:  
- meeting of International Editorial Board of the Journal *Metalurgija*.

Based of the recommendation of Menaning Board of Croatian Metallurgical Society, Editorial Board has adopted:

- Rule Book on the Journal Metalurgija, the articles 5. and 10.;
- for the Editor - in - chief is reelected Acad. Prof. D. Sc. I. Mamuzić instead of the period 2004-2008 y. for the period 2006-2010 y.

More than 150 participants were included in a round table session on the achievements, conclusions and closing of the 7<sup>th</sup> International symposium "Materials and Metallurgy".

In the discussions it was confirmed that the symposiums organized by Croatian Metallurgical Society have become traditional assembly of experts and scientists of various profiles: metallurgists, geologists, physicists, chemists, mechanical engineers etc.

With a demonstration of their best achievements they all assist the metallurgy in Croatia to call the same attention as it does otherwise in the world.

Subsequently we give some of the discussions on the 7<sup>th</sup> Symposium following sections:

#### F. Vodopivec: *Materials* - Section "A"

188 summaries were selected for this section of the symposium. It is, thus, understandable that in the range of time given, it was not possible to prepare a real survey, but only a short recording of main topics investigated and of the purposes aimed. To obtain a better overview on the content of this section of the symposium, the summaries were classified in 16 groups on the base of the content, as it could be understood from the summary. In most of the summaries the accent is given to the goal and the method of investigation and little information is given on the achieved results. It is, thus, possible that a number of summaries were not placed in the suited group.

A wide range of topics is presented: the formation of microstructure by solidification, hot working, and heat treatment, equilibrium and kinetics of phase formation, tensile properties from crio over ambient to very high temperature, fatigue strength by stressing and combined stressing and fretting, creep rate at elevated and very high temperature, calculation of phase equilibria and kinetics, new and improved methods for the characterization, improvement of technology, development of new alloys, modelling of properties and processes, and calculation of stresses by operation and of lifetime of parts of machines and structures. In a number of summaries remarkable achievements, theoretical and for application, are presented. In this aspect, the average quality and relevance for application of the achievements reported, although

only in summaries, are improved in comparison to the previous symposium.

In the majority of summaries the alloy investigated are different steels. In a number of summaries also results on investigations on aluminium, titanium, magnesium, nickel, zirconium, niobium, molybdenum, copper and heavy metals alloys are reported. In most of the groups, the exception is only the group "Aluminium and magnesium" alloys, investigations on alloys with different base metal are included.

In comparison to the previous symposium, the number of summaries reporting on investigations on amorphous and nano grain size alloys and summaries with theoretical calculations of equilibria and properties as well as modelling are increased. Of equal importance is the considerable number of summaries on calculation of the stressing of parts in use and of degradation of properties due to surface oxydation or microstructural processes at the temperature of operation f.i. steels in parts of thermal power works.

The summaries were submitted mainly scientists from universities and institutes. Authors from industrial companies are found in 22 summaries, mostly in those submitted from Slovenian scientists.

The number of authors of summaries is in the range one to seven, mostly two or three.

The countries of origins of authors are: Croatia, Ukraine, Russia, Bela Rus, Litva, Polonia, Slovakia, Czech Republik, Slovenia, Romania, Turkey, Spain and Bosnia-Herzegovina. Authors from different countries are found in a small number of summaries, also.

These groups are:

- processing of ferrous and non ferrous alloys;
- powder metallurgy;
- physical metallurgy;
- mechanical properties;
- wet and dry corrosion, corrosion resistance;
- surface technology;
- computer calculation and modelling;
- composites;
- methodology of investigation;
- aluminium and magnesium alloys;
- non ferrous alloys;
- welding, microstructure and properties of welds;
- nano and amorphous alloys;
- application and degradation in service;
- miscellaneous;
- non metallic's.

#### E. Mihok: *Process Metallurgy* - Section "B"

The section contained 113 papers. According to their scope they were subdivided into fourteen groups:

- coke production;
- sintering of fine materials;
- pig iron production;

- steel production;
- non - ferrous metals;
- foundry metallurgy;
- refractories;
- production of ferroalloys;
- thermal energetics;
- environment aspects;
- smelting reduction;
- welding;
- inorganic materials;
- miscellaneous.

In some cases it was difficult to include the contribution into specific group as it contained information related to more fields.

The Symposium presented many new information both to scientists and factory staff members and we hope that this high level will be kept in the future. Our thanks are directed to organizers.

#### **P. Fajfar: *Plastic processing* - Section “C”**

69 contributions have been received for Section C on Plastic processing of materials. According to their scope they were subdivided into 9 groups:

- plastic deformation;
- plate and shape rolling;
- extrusion;
- wire drawing;
- tubes production;
- sheet metal forming;
- reheating process;
- modernization;
- miscellaneous.

The most numerous are the contributions of the scientists from Croatia, Poland, Slovenia, Russia, Slovakia, Bosnia and Herzegovina, Czech Republic, Germany, Turkey and Romania. Survey of the authors shows that nearly one fifth of the contributions are the result of co-operation between research institutes from different countries. The most evident is co-operation of Croatian scientists with colleagues from Ukraine, Slovenia, Slovakia and Bosnia and Herzegovina. Most contributions have been sent by research institutions (59), 12 of them are result of co-operation between research institutions and industry and only 4 of them have been written by authors who work only in industry.

The variety topics and different ways of the solutions of problems treated in papers presented is a confirmation of vitality of metallurgical science in Europe and in Croatia. From this point of view the organizer of 7<sup>th</sup> International Symposium of Croatian Metallurgical Society may be satisfied.

#### **P. Fajfar: *Metallurgy and Related Topics* - Section “D”**

93 contributions have been received for Section D on Metallurgy and related topics. The most numerous are the contributions of the scientists from Slovakia, Ukraine, Croatia, Poland, Russia and s. o. With the exception of four contributions presented from enterprises, the rest of them are results of scientific work in research and educational institutes.

Topics of section D are:

- marketing and management in metallurgical and mining enterprises;
- mineral engineering;
- energy sources;
- environment pollution;
- heat transfer;
- science on materials;
- computer science;
- other applications.

Although the papers presented in the section “Metallurgy and related topics” are very heterogeneous according to scientific discipline, quality and subject matter of most of the papers justify their including into the program of the symposium. Their usefulness for the branch of metallurgy can be seen in the possibility of comparison in methods and techniques used in applied research and resolving certain professional problems. First, this refers to mineral dressing and other disciplines that it leans on. Secondly, this refers to computer application for resolving technological problems. Thus, it can be concluded that including papers from other disciplines adjacent to metallurgy and wider into the program of the symposium is useful and stimulating in interdisciplinary terms for future.

Based on the analysis and evaluation of the subject matter of the symposium, the symposium has been appraised positively and it has been acknowledged that it has its place in the international exchange of knowledge.

It is reasonable to conclude that the demonstrated results of scientific and professional investigation accompanied by the complete and quality manifestations, especially discussions at the round table prove that the organizing of the 7<sup>th</sup> International symposium of Croatian Metallurgical Society “Materials and Metallurgy” in Šibenik 2006, June 18 - 22 was justified. Especially has to be emphasized that the participants will keep wonderful memories of Šibenik and Solaris Hotels.

Based on the agreement of Meeting of World Metallurgical Societies, Düsseldorf, November 2005 y. and the conclusion of the round table the next 8<sup>th</sup> International Symposium of Croatian Metallurgical Society “Materials and Metallurgy” will be held 2008 - June 21 - 25.