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Moscow
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**10-th International
Conference**

High Nitrogen Steels

Conference Proceedings



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The main activity directions of the “Metallurgy of Steel and Ferroalloys” department, Moscow Steel and Alloys Institute

1. Educational activities

Higher qualification training through post-graduate and doctoral studies.

All forms of raising the level of qualification and professional retraining (all programs are forming according to the concrete customer):

- Raising the level of qualification up to 72 hours;
- Raising the level of qualification more than 72 hours;
- Professional retraining more than 500 hours.

Master's degree education of "Metallurgy" direction according to the program: «Technological management in ferrous metallurgy» (the program content is corrected depending on requirement of the company-customer).

Engineers education of the following specialties:

- «Metallurgy of ferrous metals». Specializations:
 - Steel metallurgy;
 - Electrometallurgy of steel and ferroalloys;
 - Resource saving and ecology in metallurgy;
 - Informatics and business in metallurgy.
- «Automation of technological processes and productions». Specializations:
 - Automation of technological processes;
 - Computer simulation of technological processes.
- «Metallurgy of man-caused and secondary resources».

Bachelors education of "Metallurgy" direction according to the following profiles:

- Metallurgy of ferrous metals;
- Metallurgy of man-caused and secondary resources;
- The world market of raw materials and metals.

2. Scientific and professional activities

The main directions of research studies:

- The theory of steelmaking processes, crystallization and ferroalloys production.
- Perfection of steelmaking units working, increase of their productivity and improvement of technical and economic indices.
- Steelmaking technology.
- Secondary Steelmaking.
- Steel casting.
- Mathematical simulation of metallurgical processes.
- Ecology and resource saving of steelmaking processes.
- Theory and practice of complex alloyed and stainless steel production.
- High Nitrogen steels.
- Research and perfection of continuous steelmaking processes and secondary steelmaking.
- Automation and control of steelmaking processes.
- Reconstruction of metallurgical plants and designing of mini-mills.
 - Appraisal of the investment attractiveness of the projected plants.
- Quality control system of metal products.

Pilot production of steel, alloys and ferroalloys.

Technological audit and industrial consulting.

**Proceedings
of 10-th International Conference
on High Nitrogen Steels**

HNS 2009

**6 - 8 July 2009
Moscow, Russia**

Edited by A.G. Svyazhin, V.G. Prokoshkina,
K.L. Kossyrev

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Russia Progress in the Research and Application of Nitrogen-Alloyed Steels.

Hans BERNS, Germany

High Interstitial Stainless Austenitic Steels, Part I: Constitution, Heat Treatment, Properties, Applications.

Han DONG, China

The Recent Progress of Product Technologies of High Nitrogen Stainless Steels in China

Jacques FOCT, France

Roots and Wings of High Nitrogen Steel.

Valentin G. GAVRILIUK, Ukraine

High Interstitial Stainless Austenitic Steels, Part II: Electronic and crystal structure, effect of loading

Guocai CHAI, Sweden

Progress in high alloyed duplex stainless steels.

Kamachi MUDALI, India

Passive Films and Localized Corrosion – Role of Nitrogen

Tsolo RASHEV, Bulgaria

Problems of High Nitrogen Steel Development.

Marcel A.J. SOMERS, Denmark

Low temperature surface nitriding of stainless steel.

Markus O. SPEIDEL, Switzerland

Commercial Low-Nickel, High-Nitrogen Austenitic Stainless Steels.

Preface

In the given edition, the texts of reports submitted to the 10-th HNS Conference being held in Moscow, July 6 to 8, 2009, are collected. HNS 2009 in Moscow is in a series of international conferences, devoted to research, production and applications of High Nitrogen Steels (HNS), which have been successfully held in France, Germany, Ukraine, Japan, Finland and Sweden, India, Switzerland, Belgium and China since 1988.

High Nitrogen Steels is one of the most prospective concepts and trends in the development of advanced steel materials. Nitrogen is a unique element as it imparts to steels new properties, which can not be obtained by the use of other alloying elements. Nitrogen containing carbon and stainless steels having the unique properties are widely used in aviation, nuclear projects, defense and arms, oil & gas industries.

More than 20 years have passed after the first HNS conference (1988, Lille, France). During these years, a new direction in metallurgical science was generated, the international community of researchers and engineers interested in the HNS problems was generated.

During the expired years, a significant progress in the knowledge of alloying processes under normal and high pressure for nitrogen-containing steels and in studying the nature of the HNS structure and properties formation has been reached, new application fields for HNS have been found out. Industrial manufacturing of the HNS products for power industry, transport, chemical and food-processing industries and medicine successfully expands.

It should be noted, however, that the use of HNS is still not enough in comparison with the possibilities presented by the knowledge of the HNS properties accumulated up to the present time. The possibilities of nitrogen as an alloying element are not studied enough.

At the conference, the tendencies of HNS development have been considered, new results of research works in the field of nitrogen alloying, thermodynamics and kinetics of processes, formation of structure and properties in various classes of nitrogen-containing steels as well as their corrosion resistance and surface treatment have been presented and discussed.

The HNS 2009 conference has been held in Moscow in accordance with the decision of the International Scientific Committee for High Nitrogen Steels in 2006 (China).

The conference has been organized by State Technological University "Moscow Institute of Steel and Alloys" and Research Company "RUSMET".

The HNS 2009 Conference has been sponsored by Department Metallurgy of Steel and Ferro-Alloys State Technological University "Moscow Institute of Steel and Alloys", informative support has been rendered by Journals Stal, Izvestia VUZ, Metallurg, Electrometallurgy, and this is gratefully acknowledged.

The book can be useful to researchers, engineers and students interested in the HNS problems.



Anatoly G. Svyazhin
Chairman of HNS 2009 Conference

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