



SESSION OF THE SCIENTIFIC COUNCIL ON NEW MATERIALS AT THE NATURAL SCIENCES COMMITTEE OF THE INTERNATIONAL ASSOCIATION OF THE ACADEMIES OF SCIENCES

The 15th Session of the Scientific Council on New Materials at the Natural Sciences Committee of the International Association of the Academies of Sciences (IAAS) took place on 26–27 May 2010 in Kiev at the E.O. Paton Electric Welding Institute. The subject matter of the Session was «New Processes for Production and Processing of Metallic Materials».

Over 100 scientists and specialists in the field of materials science from academies of sciences, institutes of higher education and enterprises of Belarus, Kazakhstan, Russia and Ukraine took part in the Session of the Scientific Council.

The first day of the Session, 26 May, was dedicated to meetings of the sections on copper-base and polymeric materials, and the plenary session took place on 27 May. This allowed discussing at the plenary session some proposals and remarks on further activities of the Scientific Council put forward in the course of the sections.

The plenary session of the Scientific Council was opened by Prof. B.E. Paton, Chairman, President of IAAS, President of the NAS of Ukraine and Director of the E.O. Paton Electric Welding Institute. He said that the plenary session of 2010 would cover a wide range of problems in the field of materials science. 21 papers were submitted to the plenary session, from which the most interesting 12 papers were selected for presentation. A large number of papers are indicative of an increasing interest to the Scientific Council on New Materials.

Prof. B.E. Paton introduced participants to the program and agenda of the plenary session, at which the papers were to be presented by scientists from Belarus, Kazakhstan, Russian Federation and Ukraine.

Prof. E.N. Kablov, Academician of the Russian Academy of Sciences (All-Russian Scientific Research Institute of Aviation Materials – VIAM, Moscow, RF) presented paper «Advanced Technologies for Manufacture of Parts from a New Generation of Heat-Resistant Alloys». He noted that brazing is widely used now in aircraft engineering. About 50 grades of tin, lead, copper, silver, nickel and titanium based brazing filler alloys are employed in aviation for brazing different components. Part of these filler alloys can be made only in the form of powders. VIAM launched a unit that allows manufacturing the high-

quality powder filler alloys on industrial scales. Associates of the Institute developed fundamentally new technologies for thermomechanical treatment of hard-to-deform heterophase alloys, providing formation of regulated structures with increased ductility at optimal temperature-rate deformation parameters. Also, the methods were developed for production of castings with directed and single-crystal structures.

Paper «Electron Beam Technology for Production of Micro- and Nanosized Powders of Inorganic Materials» by Prof. B.A. Movchan (E.O. Paton Electric Welding Institute, Kiev, Ukraine), Academician of the NAS of Ukraine, was dedicated to new technologies for manufacture of micro- and nanosized powders of inorganic materials. The International Centre for Electron Beam Technologies of the E.O. Paton Electric Welding Institute built an electron beam unit for production of solid- and liquid-phase substances with nanoparticles of inorganic materials. The developed technology allows controlling the composition, shape and structure of nanoparticles of inorganic materials, mostly different oxides.

Prof. V.E. Panin (Institute of Strength Physics and Materials Science, Siberian Branch of the Russian Academy of Sciences, Tomsk, Russia), Academician of the Russian Academy of Sciences, dedicated his paper «Topical Problems of Nanostructuring of Surface Layers of Structural Materials and Their Welded Joints» to investigation of the effect of nanostructuring of surface layers on strength and service properties of materials. Deposition of nanostructured coatings provides increase not only in strength but also in ductility of steel, leads to increase of fatigue strength in cyclic tests to alternating bending, as well as improvement of wear resistance and thermal stability of treated materials.

Prof. N.P. Alyoshin (Research and Education Centre «Welding and Inspection» at the N.E. Bauman Moscow State Technical University, Moscow, RF), Academician of the Russian Academy of Sciences, told about advantages and drawbacks, as well as prospects of development of acoustic methods for non-destructive testing.

Paper «Scientific Bases of Production of Nanometallic Materials» by Prof. S.A. Firstov (Institute for Problems of Materials Science, Kiev, Ukraine), Academician of the NAS of Ukraine, focused on the prob-



lems to be addressed by scientists in transition from materials with microcrystalline structure to materials with nanocrystalline structure, as well as properties of materials with such a structure. If before the improvement of strength properties of structural materials was provided mainly by development of alloys with new chemical and phase compositions, new ways of improving properties of structural materials have been outlined in the last years, consisting in targeted formation of nanocrystalline structure in these materials.

«Development of High-Strength Titanium Alloys for Marine Engineering» was the subject of the paper by associates of CRISM «Prometej» (St.-Petersburg, Russia), which was presented by Dr. B.G. Ushakov. Alloys intended for manufacture of structures operating in sea water should have high corrosion resistance, good weldability and high mechanical properties, in particular, ductility in pressure treatment. Such alloys were developed as a result of completion of a large scope of research. New materials based on titanium of the 5V type feature an increased level of strength characteristics and optimal combination of service properties (fracture toughness, resistance to elasto-plastic deformations, creep resistance).

Prof. V.I. Dubodelov (Physico-Technological Institute of Metals and Alloys, Kiev, Ukraine), Corresponding Member of the NAS of Ukraine, talked about application of electromagnetic effects and an ingenious

MHD technique in new processes of production of parts from non-ferrous metals, steel and cast iron.

The paper by associates of the Institute for Metal Physics of the NAS of Ukraine (Kiev), presented by Prof. V.F. Mazanko, considered the abnormal transfer phenomenon under external effects on metals and methods for its practical application. It is the opinion of the authors that this phenomenon can be used for pulse pressure welding methods, thermochemical-mechanical treatment, modification of surface layers of metal, repair of worn-out surfaces, production of coatings with different properties: corrosion- and wear-resistant, anti-emissive and decorative, and with amorphous and nanostructured state.

Participants of the session during discussions had the opportunity to share opinions on the presented papers and state-of-the-art in the field of development of new materials in their countries, estimate activities of the Scientific Council on New Materials, and express wishes on their improvement. Annual sessions of the Scientific Council on New Materials of IAAS allow preserving and developing creative contacts between scientists of different countries, and promote intensification of information exchange between them.

It is scheduled to hold the next Session of the Scientific Council on New Materials of IAAS in May 2011 at the E.O. Paton Electric Welding Institute.

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