Overview of the 15th International Scientific and Technical Conference Rapid Solidification Materials and Coatings

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Abstract. This review discusses the key features and main results of the 15th International Scientific and Technical Conference Rapid Solidification Materials and Coatings, which took place on October 16–17, 2018 in Moscow.

From 16 to 17 October 2018, the 15th International Scientific and Technical Conference Rapid Solidification Materials and Coatings (RSMC–2018) was held at the Moscow Aviation Institute (National Research University).

At the Conference the results, which were obtained in the last two years after the previous Conference, of the theoretical and experimental studies on the physics of condensed matter, low-temperature plasma physics, electronic and ion-plasma surface modification, physical methods of films and coatings application were presented.

The Conference was attended by more than 100 specialists from leading universities, the Russian Academy of Sciences and enterprises of Russia, as well as scientists from Austria, China, Belarus, Ukraine and the Kazakh-British Technical University.

The main objects of the above studies were surface and surface phenomena. Therefore, to the development and improvement of methods of surface modification and coatings deposition, as well as methods of their research and development of modern surface treatment equipment was paid the greatest attention at the Conference.

During the Conference more than 60 reports were presented, which were heard in the following sections (figure 1):

• section 1 – Rapid solidification materials;
• section 2 – Methods of coating application and research;
• section 3 – Laser, electron-beam and ion-plasma methods of surface modification;
• section 4 – Composite materials and permanent joints.

In his welcoming speech to the participants of the plenary session Director of the Department of Materials and Materials Technology, Moscow Aviation Institute (National Research University) Alexander Vladimirovich Bespalov stressed the key role of technologies for obtaining and processing of new materials to create promising developments for the aerospace industry. He also noted the leading position in the world of scientists of the Department on a number of developments in the field of coatings deposition and rapid solidification materials.
Figure 1. Working sessions of the Conference.

Plenary reports of the Conference were devoted to theoretical and practical aspects of rapid solidification, surface modification and coatings deposition technologies. The issues of development of technologies and equipment for vacuum-plasma surface modification for the creation of highly...
reliable precision friction units of a new generation, the laws of carbon fiber surface corrugation by high-dose ion irradiation, the study of the structure of magnesium alloys obtained by rapid solidification of the melt on a rotating heat sink were discussed. Reports on the analysis of materials under ion-beam excitation of X-ray fluorescence and the study of nanostructured gradient coating with an upper layer of hafnium oxide aroused great interest.

In a number of reports new variants of magnetron sputtering systems were presented, including inverted, the characteristics and principles of coatings deposition on their basis were given, including the application of composite multi-layer coatings on substrates of complex shape. Thermal processes in hot-target magnetron assemblies and conditions of operation of the magnetron with a sandwich target were discussed. A number of reports were devoted to the study of the parameters of oxide layers formed by plasma-electrolytic oxidation.

Considerable attention was paid to reports on the use of vacuum-arc discharge for the application of wear-resistant coatings, as well as ion-plasma modification of various carbon materials, in particular – modification of carbon fabric Busofit T-040. The features of graphite erosion under high-temperature ion irradiation were presented.

In part of the reports on improving the efficiency of metallurgical technologies, the processes of high-temperature interaction of the liquid metal phase with the surface of a solid body and solid-phase interaction in the creation of metal-ceramic composites were considered.

Great interest of participants was aroused by the reports on the analysis of layered inhomogeneous samples by spectroscopy of reflected electrons and modeling the generation of flows of neutral atoms in the channel rays of the glow discharge.

Figure 2. Summing up the results of the 15th International Scientific and Technical Conference Rapid Solidification Materials and Coatings.

In summing up the results of the conference (figure 2), the participants noted the high level of reports on topical issues of the formation of physical and physico-chemical methods of surface layers of products with desired properties, the creation of industrial equipment and the development of new technological processes. Thus, the 15th International Scientific and Technical Conference Rapid Solidification Materials and Coatings (RSMC–2018) contributed to the further development of this scientific and applied area of research and expansion of professional relations of the participating scientists.