Overview of the 17th International Scientific and Technical Conference Rapid Solidification Materials and Coatings

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Abstract. This overview presents the key features and main goals of the 17th International Scientific and Technical Conference Rapid Solidification Materials and Coatings, which took place on October 20–21, 2020 in Moscow.

From 20 to 21 October 2020, the 17th International Scientific and Technical Conference Rapid Solidification Materials and Coatings (RSMC–2020) was held at the Moscow Aviation Institute (National Research University).

Despite the difficulties associated with the coronavirus pandemic, more than 100 specialists from leading universities, the Russian Academy of Sciences and Russian enterprises, as well as scientists from Ukraine and Belarus, took part in the conference.

At the Conference the results, which were obtained in the last year 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 film deposition and other studies obtained over the last year after the previous conference.

The main objects of these studies were superficiality and superficial 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.

For the successful holding of the conference in a pandemic, all the necessary measures were taken to ensure the implementation of sanitary rules and standards for the protection of conference participants.

During the Conference more than 80 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;
• section 5 – Works of young scientists.
Figure 1. Working sessions of the Conference.
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.

Plenary reports of the conference were devoted to the theoretical and practical aspects of new methodics for determining the properties of thin films and coatings based on Rutherford backscattering, X-ray fluorescence analysis under conditions of total external reflection of the excitation flux and traditional X-ray photoelectron spectroscopy. A study of the effect of electrolytic-plasma polishing on the surface properties of nitrocarburized steel was also presented.

Figure 2. Summing up the results of the 17th International Scientific and Technical Conference Rapid Solidification Materials and Coatings.

A number of reports presented the continuation of research on the use of inverted magnetrons for solving new problems, including the application of composite multilayer coatings on substrates of complex shapes. Further development of a physicochemical model of reactive sputtering for a magnetron with a sandwich target is proposed. A number of reports were devoted to the continuation of research in the field of microarc oxidation.

Considerable attention was paid to reports on the formation of nitride protective coatings by vacuum-arc and magnetron methods, as well as ion-plasma modification of various carbon materials. The effect of the carbon fiber nanostructure on the surface morphology under high-dose ion irradiation has been studied.

In the part of reports on increasing the efficiency of metallurgical technologies, the architecture of interlayers for solid-phase interaction during the creation of silicon-copper cermet composites was considered, as well as the effect of laser processing of metal surfaces on the formation of diffusion-welded joints. Reports on various aspects of obtaining rapid solidification materials aroused great interest of the Conference participants.

Summing up the results of the conference (figure 2), the participants noted the high level of reports on topical issues of the formation by physical and physicochemical methods of surface layers of products with desired properties, the creation of industrial equipment and technologies. Thus, the 17th International Scientific and Technical Conference Rapid Solidification Materials and Coatings (RSMC–2020) contributed to the further development of this scientific and applied area of research and expansion of professional relations of the participating scientists.
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