Synthesis and Consolidation of Powder Materials – Achievements and Prospects

From October 23 to October 26, the International Conference on Synthesis and Consolidation of Powder Materials (SCPM-2018) was held at the Scientific Center of the Russian Academy of Sciences in Chernogolovka, Moscow Region. The conference was organized by the Institute of Structural Macrokinetics and Materials Science named after A.G. Merzhanov (ISMAN) with the support of the Russian Foundation for Basic Research (RFBR).

During the conference, specialists from Russia, Belarus, France, Germany, USA, Latvia, Turkey, Georgia presented their studies. The scientific event lasted for three days; with about 160 papers (including 11 keynote speakers and 68 speakers) were presented and discussed. The number of young researchers was quite impressive, demonstrating the great interest of young researchers in this area of science.

At the opening ceremony, M.I. Alymov, Chairman of the International Council of the Conference, RAS Corr. Member, Director of ISMAN noted in his speech that such an event – a conference of extended topics – was held for the first time, and it was supposed to become a platform for communication of leading experts from related fields of scientific research and it would contribute to solving fundamental problems of creating new powder materials to meet the growing demands of modern industry.

The director of the Scientific-Training Center of the Self-Propagating High-Temperature Synthesis (SHS) MISiS-isman, Professor E.A. Levashov addressing the participants, also noted the uniqueness of the current conference. He stressed that the scientific forum brought together specialists from different fields for the first time, and the idea of combining powder metallurgy with synthetics turned out to be quite promising.

The representative of JSC “Kompozit” (Korolev) I.M. Razumovsky also expressed great interest in the new format of the scientific event. He noted that “Kompozit” has had an interest in powder metallurgy since the beginning of space flights: the gas turbine disks prepared by casting methods turned out to be of insufficient quality, which led to the transition to powder metallurgy.

The first keynote speaker was M.I. Alymov, who presented the findings of the ISMAN research on the synthesis of powder materials using self-propagating high-temperature synthesis (SHS) methods and the production of new consolidated materials and products directly in the SHS process (in-situ). Professor Frederic Bernard (Prof. Frédéric Bernard) from the University of Burgundy (Dijon, France) continued the discussion. He presented the results of the long-term work on the sintering of ultrafine powder materials by the methods of electric spark sintering (Spark Plasma Sintering). A detailed review of the achievements of the faceting metallurgy in the field of rocket and space technology was presented by I.M. Razumovsky. The analysis and recommendations presented on the creation of new promising heat-resistant materials for faceting metallurgy and additive technologies were of particular interest. An expanded report by E.A. Levashov, reflecting the uniqueness of the SHS method for obtaining ultrahigh-temperature materials capable of long-term operation at temperatures above 2000 °C, completed the plenary session.

This conference aimed at combining the interests of “synthetics scientists” – specialists involved in the synthesis of new materials, and “powders scientists” – scientists and technologists aimed at obtaining final products using various methods of consolidating the above-mentioned source materials.

The exchange of new achievements in the field of the theory and technology of the synthesis of initial materials with new properties to better implement the operational properties will contribute to the solution of some practical problems, including the creation of new transparent materials for laser technology and transparent armor, new highly effective catalysts for processing hydrocarbons, the creation of ultra-high-temperature materials for various applications.

Traditionally, scientific schools from ISMAN (Chernogolovka), MISiS (Moscow), Samara State Technical University (Samara), Tomsk State University and others presented high-quality research on the synthesis of powder and compacted materials using the SHS method.
A big “delegation” of researchers from the University of Burgundy (Dijon, France) presented reports on molecular modeling of the processes involved in the mechanosynthesis and sintering of powder materials. French colleagues have made advances in the technology of sintering ultrafine powder materials by the methods of electric spark sintering (Spark Plasma Sintering), including dielectric materials.

The international seminar “Consolidation of materials using electromagnetic fields” was held as part of the conference. In addition, there were round tables, discussing the relevant problems of creating new materials by combining the knowledge and efforts of specialists from related industries.

Along with speaker presentations, poster sessions, displays of products and samples, as well as promotional materials were presented.

The symposium delegates visited the ISMAN laboratories where they got familiar with the activities of the institute and discussed plans for joint research.

The representatives of the scientific community of France, Latvia, Russia and Belarus gave speeches at the closing ceremony. They shared their impressions of the event, highly appreciated it, and expressed hope for further cooperation and the opportunity to take part in this international discussion platform once again.

At the closing ceremony of the conference, delegates unanimously expressed a desire to continue the idea embodied in the SCPM-2018 process. Such communication will help to solve the fundamental problem of creating new powder materials that meet the growing demands of modern industry and promising technologies.

M.I. Alymov
V.N. Sanin
O.O. Likhanova