

## **FIRST INTERNATIONAL SYMPOSIUM ON SELF-PROPAGATING HIGH-TEMPERATURE SYNTHESIS**

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In the present and subsequent issues of *Inzhenerno-Fizicheskii Zhurnal* some papers presented at the first International SHS Symposium held in Almaty on September 23 to 28, 1991, will be published. The total number of papers presented was 207, including 3 plenary lectures, 41 oral communications, 156 progress reports, and 7 minireviews. The Symposium was attended by scientists from six countries of the former Soviet Union, namely Armenia, Belarus, Georgia, Kazakhstan, Russia, Ukraine, and fourteen foreign countries: Bulgaria, Germany, India, Spain, Canada, China, Poland, the U.S., Taiwan, France, Czechoslovakia, South Korea, South African Republic, Japan. The most numerous were scientists from Russia (113 papers), Kazakhstan (20), the U.S. (16), China (12), Armenia (11), and Japan (9).

The symposium was opened by the plenary lecture "Worldwide Development of SHS" presented by A. G. Merzhanov, Chairman of the Organizing Committee, in which he reported the latest and most important SHS results by obtained by scientists from different countries and analyzed the present state and prospects in the field. The papers submitted were divided among seven subject sessions, four of which were devoted to basic macrokinetic problems of chemical SHS reactions and three, to material science and technology applications. Every session was opened by an invited lecture (a minireview) on the subject of the session. Then, invited oral reports on the most important trends were presented. The progress reports contained the authors' original results.

Thirty reports were concerned with the laws and mechanisms of SHS combustion. Their authors considered distinctive properties of synthesis wave propagation in various reacting systems, studied and mechanical properties of the SHS products as a function of the synthesis conditions, determined the regions of existence of different combustion modes, discussed advanced diagnosis methods, etc.

Problems of the thermodynamics and kinetics of SHS reactions were treated in 24 papers, in which thermodynamic analysis of the high-temperature interaction of components of a wide range of systems was carried out and its kinetic trends were followed. In some of them it was shown that kinetic constants could be determined from nonisothermal experiments, in others the role of gas transport reactions in the SHS process was analyzed.

Results on the theory and mathematical simulation of SHS processes were presented in 25 papers, in which the mathematical description of processes occurring in SHS systems was given, using appropriate sets of equations, and numerical computations were conducted to reveal the effects of various process parameters on the process characteristics and the time changes of the concentration and temperature fields. For a process with a gaseous reacting component (nitriding, hydrogenating, etc.), the effect of the filtration supply of the component to the reaction zone on the course of the process was found.

Problems of the structural macrokinetics of SHS processes were considered in 35 papers. This research trend, intensely developed in recent years, concerns the structural evolution of a material in the course of chemical transformations with account for heat and mass transfer. Those papers also treated phase formation processes, laser, ultrasonic, and other effects on the synthesis process, the laws of porous structure formation, the relations between structural, physical, and mechanical properties, etc. All these problems are of vital importance in predicting the properties of materials produced by SHS synthesis.

Thirty-one papers dealt with the chemistry of SHS combustion. This is a research line that is important for expanding the chemical basis of the synthesis and the range of raw materials. The SHS production of oxide superconductors is an outstanding achievement in this field. SHS superconductors have some specific properties that make them advantageous over those produced by other methods.

Sixty papers (two sessions) were devoted to properties of SHS materials and production processes. Particular production processes (production of multilayer tubes of large size, refractory materials, and gradient, composite, and other materials, SHS extrusion, etc.) as well as properties of the materials and their relations with the process parameters were considered. Prospects of using acoustic effects in SHS technologies were discussed. Since SHS technologies attract great interest, it was felt that many speakers avoided dwelling upon matters of know-how.

The participants expressed their gratitude to scientists and authorities of Kazakhstan for the excellent organization of the symposium. The Second International SHS Symposium will be held in Honolulu (Hawaii, USA) on November 7 to 10, 1993.

Materials of the First Symposium will be published almost completely (a few participants did not submit their papers for publication). Minireviews were published in *Pure and Applied Chemistry*, Vol. 64, No. 7 (1992). Many papers were published in the four issues of the first volume of the *International Journal of Self-Propagating High-Temperature Synthesis*. Publication of these materials will be continued in the first issues of the second volume of that journal. Papers on the subjects of *Inzhenerno-Fizicheskii Zhurnal* are presented in the present issue of this journal.