

## Preface

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# The 16<sup>th</sup> International IUPAC Conference on High Temperature Materials Chemistry (July 2–6, 2018, Ekaterinburg, Russia)

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**Keywords:** carbides; conductivity; corrosion; high-temperature materials; HTMC-XVI; intermetallics; inter-phase boundaries; metals; nitrides; oxides; phase structure; salts; surfaces; theory and modeling; thermodynamic measurements.

The 16<sup>th</sup> International IUPAC Conference on High Temperature Materials Chemistry (HTMC-XVI) was organized in Ekaterinburg (Russia) on July 2–6 (2018) by the Ural Federal University, the Ural Branch of the Russian Academy of Sciences (UB RAS), the Institute of Metallurgy of the UB RAS, and the Ural State Pedagogical University.

The goal of the HTMC-XVI meeting was to bring together people from the fields of chemistry, physics, materials science, metallurgy, who are working in the area of high temperature phenomena in solid and liquid materials.

The HTMC-XVI had continued a series of conferences held every 2–4 years since 1977. Previous events were organized in France (Odeillo, 1977; Orleans, 1991; 2016); Canada (Toronto, 1979); UK (Harwell, 1981); USA (Santa Fe, 1984; Gaithersburg, 1989; University Park, 1997; Davis, 2009); Italy (Rome, 1987); Austria (Vienna, 1994; 2006); Germany (Julich, 2000); Japan (Tokyo, 2003); China (Beijing, 2012).

The list of main topics of the Conference had been reproduced mainly from the three previous editions (Davis, USA, 2009; Beijing, China, 2012; Orleans, France, 2016). It includes important aspects of high temperature materials chemistry such as thermodynamics, theory and modeling, phase structure, ionic and electronic transport phenomena and covers numerous natural and synthetic materials for various applications, such as nuclear energy, aerospace, metallurgical processes.

Together with the traditional items, the new topic concerning materials for advanced sources of energy had been added to the HTMC-XVI scientific program. Development of materials for the energy sources application becomes a hot topic in a modern material science since commercialization of renewable energy sources is limited mainly due to the poor durability and quick degradation of the constituents. A wide range of studies aimed at the development of energy harvesting materials and devices for solar energetics, fuel cells, batteries, thermoelectric cells is carried out all over the world. Nevertheless, a lot of unresolved problems and questionable items still exist. Thereby the new section became an excellent platform for discussions and

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**Article note:** A collection of invited papers based on presentations at the 16<sup>th</sup> International IUPAC Conference on High Temperature Materials Chemistry (HTMC-XVI), held in Ekaterinburg, Russia, July 2–6, 2018.

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ideas exchange; it gave good opportunity to establish new links between scientists, engineers and business, which finally brings benefits to the mankind in solving environmental problems.

The scientists from 12 countries (Russia, France, Slovakia, China, Germany, India, Sweden, Algeria, Austria, Canada, Japan, USA) attended the Conference (Fig. 1).



**Fig. 1:** Group photo of the HTMC-XVI Conference participants at the bank of the Iset River near the historical centre of Ekaterinburg.



**Fig. 2:** Visit of the participants to the Europe-Asia geographical border near Ekaterinburg.

Over 250 presentations took place in the framework of the following 9 sections:

- A: High temperature thermodynamic measurements (1 plenary, 1 invited, 11 oral, 14 poster presentations);
- B: Theory and modeling of high temperature materials (1 plenary, 1 invited, 14 oral, 25 poster presentations);
- C: Melts, ceramics, glasses and amorphous materials (1 plenary, 1 invited, 12 oral, 44 poster presentations);
- D: Transport, ionic and electronic conductivity, grain boundaries, interfaces and surfaces (1 plenary, 4 oral, 25 poster presentations);
- E: Phase structure and metallurgical processes, corrosion (1 plenary, 1 invited, 10 oral, 28 poster presentations);
- F: Earth and planetary materials at high pressures and temperatures (2 invited, 3 oral presentations);
- G: Materials for nuclear energy applications (1 plenary, 1 invited, 9 oral, 14 poster presentations);
- H: Materials for aerospace applications (1 plenary, 6 oral, 7 poster presentations);
- I: Materials for advanced sources of energy (1 plenary, 1 invited, 6 oral, 21 poster presentations).

The Cultural Program of the Conference included sightseeing tours to the unique local places of interest (Fig. 2).

A collection of the papers based on plenary and invited talks at the HTMC-XVI is presented below in this issue of *Pure and Applied Chemistry*.

The HTMC-XVI had given a significant impulse to future development of theoretical and experimental studies as well as the interconnection between them in the field of phenomena, processes and properties of high temperature materials.

The 17<sup>th</sup> edition of the HTMC Conference will be held in Trenčianske Teplice (Slovakia) in 2021 (Fig. 3).



Fig. 3: Dr. M. Boča, Slovakia, announces the next HTMC Conference.