2nd INTERNATIONAL YOUTH SUMMER SCHOOL
«AEROGELS: FROM LABORATORY TO INDUSTRY»
Moscow, 21-23 August 2019.

The 2nd International Youth Summer School "Aerogels: from laboratory to industry" has been held at Mendeleev University of Chemical Technology of Russia (International Science and Education Center for Transfer of Biopharmaceutical Technology) in Moscow from 21-23 August 2019. The Youth Summer School was focused on various aerogels applications, commercialization of aerogels and its transfer to industry. Special master-classes were organized in the following areas: «Aerogels with embedded carbon nanotubes», «Modelling of aerogel properties and characteristics», «Modeling the supercritical processes using CFD». For the first time the special Round Table «Aerogels and supercritical technologies: Transfer to industry» was organized. The main goal of this event was to focus on the problems of aerogels commercialization and its transfer to industry. The following representatives from Russian industry was invited to the meeting: «Niagara» company (production of new insulating materials, Russia), «BASF Polyurethanes GmbH» (Germany), LLC «Aerogel Technologies» (USA), AEROGELEX UG (Germany), ChemTeam, LG Technology Center Moscow (Russia), Private institution of state corporation «Rosatom» (Russia), JSC NPK Chemical Engineering (Russia), Wingflow AG (Switzerland), LLC «Rohrer» (Switzerland).

Venue: Mendeleev University of Chemical Technology of Russia (MUCTR).
The organizers: Mendeleev University of Chemical Technology of Russia, Embassy of Switzerland in Russia

SCIENTIFIC PROGRAM

21 AUGUST

Moderators: Dr. Pavel Gurikov, Dr. Eugene Lebedev.

09.00 – 10.00 Registration

10.00 – 10.10 Welcome words. **Natalia Menshutina**, Prof. Dr. Head of the International Science and Education Center for Transfer of Biopharmaceutical Technology, Member of Swiss Academy of Science, Mendeleev University of Chemical Technology of Russia.

10.10 – 10.50 «New insights in the supercritical drying process: interpretation of the drying kinetics», **Irina Smirnova**, Prof. Dr.-Ing., Director of Institute of Thermal and Separation Processes, Technical University Hamburg-Harburg, Germany.

10.50 – 11.20 «Commercialization of Mechanically Strong Aerogels: Monolithic Aerogels as Multifunctional Lightweight Structural Materials», **Stephen Steiner,** President & CEO, Aerogel Technologies, LLC, USA.

11.20 – 11.50 «Recent Progress on Processing of Biopolymer Aerogels», **Pavel Gurikov**, Jun.-Prof. Dr., Scientific coordinator of "Nanoporous materials" in the Institute of Thermal Separation Processes, Technical University Hamburg-Harburg, Germany.

11.50 – 12.20 «Morphology motivated modelling of dry and wet biopolymer aerogels», **Ameya Rege**, Dr., German Aerospace Center, Cologne, Germany.

12.20 – 14.20 Lunch and excursions to the laboratories

14.20 – 14.40 «Modeling and scale-up the supercritical drying process», **Artem Lebedev**, Dr., Senior Researcher, Mendeleev University of Chemical Technology of Russia.

14.40 – 15.00 «Evaluation of CO2 driven processes for the production of biopolymeric mesoporous networks», **Raman Subrahmanyam**, Dr., Scientific co-worker, Technical University Hamburg-Harburg, Germany.

15.20 – 15.30 «Refractive index is a key parameter of aerogels for Cherenkov radiators», **Anton Shalygin**, Researcher, Boreskov Institute of Catalysis, Novosibirsk, Russia.

15.30 – 16.30 Coffee-break and **Poster Session**

16.30 – 16.40 «Hydration induced structural changes in silica-gelatin and silica-casein hybrid aerogels», **Attila Forgács**, Department of Inorganic and Analytical Chemistry, University of Debrecen.

16.40 – 16.50 «A continuous countercurrent process for the production of aerogel particles with supercritical CO_2», **Fynn Mißfeldt**, PhD, Technical University Hamburg-Harburg, Germany.

16.50 – 17.00 «Functional hybrid materials based on aerogels and coordination compounds», **Khursand Yorov**, PhD, Lomonosov Moscow State University, Moscow, Russia.

17.00 – 17.10 «Pressurization step in aerogel drying: kinetics of solvent extraction», **Anja Hajnal**, master of Science, Technical University Hamburg-Harburg, Germany.

17.10 – 17.20 «Hybrid silica-carbon aerogels tuning through characterization and modelling», **Emanuele Piccoli**, Building Energy Materials and Components, Empa - Swiss Federal Laboratories for Materials Science and Technology, Switzerland.

17.20 – 17.30 «Structure and properties of aerogels with embedded carbon nanotubes», **Pavel Tsygankov**, Dr., Lead engineer, Mendeleev University of Chemical Technology of Russia.

17.30 – 17.40 Resume of the 1st day

17.40 – 21.00 Fourchette

22 AUGUST

Master-classes

10.00 – 12.00 Master-class «Aerogels with embedded carbon nanotubes», **Pavel Tsygankov**, Dr., Lead engineer, Mendeleev University of Chemical Technology of Russia.

12.00 – 12.15 Coffee-break

12.15 – 14.15 Master-class «Modelling of aerogel properties and characteristics», **Igor Lebedev**, Dr., Lead engineer, Mendeleev University of Chemical Technology of Russia.

14.15 – 14.30 Coffee-break

14.30 – 16.30 Master-class «Modeling the supercritical processes using CFD», **Eugene Lebedev**, Dr., Senior Researcher, Mendeleev University of Chemical Technology of Russia.

16.30 – 17.00 Coffee-break

17.00 – 22.00 Evening in Moscow

22 AUGUST

ROUND TABLE

«Aerogels and Supercritical Technologies: Transfer to Industry»

Chairman: **Natalia Menshutina,** Prof. Dr. Head of the International Science and Education Center for Transfer of Biopharmaceutical Technology, Member of Swiss Academy of Science, Mendeleev University of Chemical Technology of Russia.

10.00 – 10.10 Welcome words. **Natalia Menshutina**, Prof. Dr. Head of the International Science and Education Center for Transfer of Biopharmaceutical Technology, Member of Swiss Academy of Science, Mendeleev University of Chemical Technology of Russia.

10.10 – 10.30 «Organic and hybrid aerogels: Research and Developments at TU Hamburg», **Irina Smirnova**, Prof. Dr.-Ing., Director of Institute of Thermal and Separation Processes, Technical University Hamburg-Harburg, Germany.

10.30 – 10.50 «Commercialization of aerogels as high performance thermal insulation materials», **Marc Fricke**, Dr., BASF Polyurethanes GmbH, Global Marketing - High Performance Insulation Materials, Germany.

10.50 – 11.20 «Commercializing Novel Aerogels: Product Development, Market Identification, Financing, Intellectual Property, and Legal Considerations», **Stephen Steiner,** President & CEO, Aerogel Technologies, LLC, USA.

11.20 – 11.40 «Aerogelex: Scaling solutions for aerogel commercialization», **Raman Subrahmanyam**, Dr., CEO AEROGELEX UG, Germany.

11.40 – 12.00 «Industrial production of aerogel based heat insulation: technology and product demand in Russia», **Artem Lebedev**, Dr., Senior Researcher, Mendeleev University of Chemical Technology of Russia.

12.00 – 13.00 Discussion with representatives of foreign and Russian manufacturers.

13.00 – 13.20 Round table summary.

13.20 – 14.00 Lunch

17.00 – 22.00 Evening in Moscow

Participants of the Round Table

- **Natalia Menshutina,** Prof. Dr. Head of the International Science and Education Center for Transfer of Biopharmaceutical Technology, Member of Swiss Academy of Science, Mendeleev University of Chemical Technology of Russia.
- **Irina Smirnova,** Prof. Dr.-Ing., Director of Institute of Thermal and Separation Processes, Technical University Hamburg-Harburg, Germany.
- **Marc Fricke,** Dr., BASF Polyurethanes GmbH, Global Marketing - High Performance Insulation Materials, Germany.
- **Stephen Steiner,** President & CEO, Aerogel Technologies, LLC, USA.

- **Pavel Gurikov**, Jun.-Prof. Dr., Scientific coordinator of "Nanoporous materials" in the Institute of Thermal Separation Processes, Technical University Hamburg-Harburg, Germany.
- **Raman Subrahmanyam,** Dr., CEO AEROGELEX UG, Germany.
- **Barbara Milow**, Dr., Vice Director of Institute and Head of Department, Institute of Materials Research.
- **Alexander Beloglazov**, CEO, LLC «Niagara».
- **Dmitry Nesterov**, Project manager, LLC «Niagara».
- **Anatoly Ignatov**, CEO, Private limited company «Peterpaip».
- **Alexander Mahonin**, Lead Engineer, Private limited company «Peterpaip».
- **Irina Markova**, production manager, Private limited company «Peterpaip».
- **Yulia Valeeva,** Senior Research Engineer, ChemTeam, LG Technology Center Moscow.
- **Alexander Herbst,** CEO, Wingflow AG.
- **Stanislav Fradkin,** CEO, LLC «Rohrer».
- **Artem Lebedev,** Dr., Senior Researcher, Mendeleev University of Chemical Technology of Russia.
- **Daria Lovskaya,** Dr., Deputy Director of International Science and Educational Center for transfer of pharmaceutical and biotechnologies Mendeleyev University of Chemical Technology of Russia.
- **Eugene Lebedev**, Dr., Deputy Director of International Science and Educational Center for transfer of pharmaceutical and biotechnologies Mendeleyev University of Chemical Technology of Russia.
- **Katalevich Anton**, Dr., Deputy Head of Department, Private institution of state corporation «Rosatom».
- **Vladimir Bikov**, Head of the Laboratory of the Moscow Institute of Physics and Technology.
- **Olga Parenago,** Dr., Moscow State University M.V. Lomonosov.
- **Ilya Kazeev**, Dr, Specialist in the field of state development support.
- **Alexander Zerkaev,** Dr, Lead sales manager, JSC NPK Chemical Engineering.
- **Elena Nikulina,** Dr, Kurchatov Institute.
- **Alexander Maslennikov**, CEO «Accelerator Mendeleev».
- **Alexander Krasnoperov,** Rector's Advisor, Mendeleev University of Chemical Technology of Russia.
- **Andrey Aleshkin**, Rector's Advisor, Mendeleev University of Chemical Technology of Russia.

23 AUGUST

On August 23, as part of the Youth Summer School, an excursion to the plant for the production of insulation materials based on aerogels took place. Tour time - from 10 a.m. to 5 p.m. The plant is completely new, it is located near Moscow, in the city of Schelkovo.

INFORMATION ABOUT THE SEMINAR

Number of registered: 120

Companies: «Niagara» company (Russia), «BASF Polyurethanes GmbH» (Germany), LLC «Aerogel Technologies» (USA), AEROGELEX UG (Germany), ChemTeam, LG Technology Center Moscow (Russia), Private institution of state corporation «Rosatom» (Russia), JSC NPK Chemical Engineering (Russia), Wingflow AG (Switzerland), LLC «Rohrer» (Switzerland), Zoerkler Gears GmbH & Co KG (Austria).

Institutes, universities: Lomonosov Moscow State University, International Research Institute of Intellectual Materials of the Southern Federal University, Federal State Unitary Enterprise Research Institute of HPEC FMBA of Russia, Chumakov Federal Scientific Center for Research and Development of Immune-and- Biological Products of Russian Academy of Sciences, Russian Academy of Sciences, NRC "Kurchatov Institute", Institute of Translational Biomedicine, St. Petersburg State University, German Aerospace Center (Institute of Materials Research. Department of Aerogels and Aerogel Composites), University Politehnica of Bucharest, "P. Poni" Institute of Macromolecular Chemistry, Hamburg University of Technology, Politechnika Wrocławska, Building Energy Materials and Components (Empa - Swiss Federal Laboratories for Materials Science and Technology).

Regions of the Russian Federation: Moscow, St. Petersburg, Rostov-on-Don, Novosibirsk.

Countries: Russia, Switzerland, Germany, USA, Romania, Hungary, Poland.

Some representatives from different countries

Switzerland:

- **Piccoli Emanuele,** Building Energy Materials and Components, Empa - Swiss Federal Laboratories for Materials Science and Technology.
- **Dr. Alexander Herbst**, General Director, Wingflow AG.
- **Stanislav Fradkin**, General Director, Rohrer LLC.

Germany:

- **Prof. Dr. Smirnova Irina**, Head of the Institute of Thermal Separation Processes.
- **Dr. Millow Barbara,** Vice Director, Department of Aerogels and Aerogel Composites, German Aerospace Center.
- **Dr. Fricke Marc**, Global Marketing - High Performance Insulation Materials, BASF.

USA:

- **Dr. Stephen Steiner III,** President & CEO, Aerogel Technologies, LLC.

Austria:

- **Montes Susan,** Engineer, Zoerkler Gears GmbH & Co KG.
- **Wagner Florian,** Engineer, Zoerkler Gears GmbH & Co KG.

FOLLOWING UP OF THE COLLABORATION

Aerogels and supercritical fluid technologies are a relatively new promising area in chemical and chemical-pharmaceutical technologies, biotechnology, food and other industries. This topic is at the peak of modern science, because it allows receiving innovative products in the framework of the big challenges described in the Strategy for Scientific and Technological Development of the Russian Federation for the long term. Mendeleev university is one of the leaders in the Russian Federation on this subject. Scientists from the International Science and Education Center for Transfer of Biopharmaceutical Technology are members of the worldwide aerogel community (http://www.aerogel.org/community) and has been conducting joint projects with universities in Switzerland and other countries for more than 10 years. International Science and Education Center for Transfer of Biopharmaceutical Technology has also Russian- Switzerland branch as confirmed by many years of joint projects.

Developments of the International Science and Education Center for Transfer of Biopharmaceutical Technology in the field of obtaining insulating materials based on inorganic aerogels was supported by the Ministry of Industry and Trade of the Russian Federation as part of a project with Niagara LLC on the organization of a pilot production. This is the first pilot production in all Russia. Cooperation with colleagues and partners from Switzerland will allow to expand the geography of developments that go from the laboratory level to the industrial one. And this is a completely new and interesting direction for cooperation between two countries.

The School is aimed at promoting Russian developments, developing long-term relationships in the framework of international cooperation especially with Switzerland, bringing together representatives of the Russian and foreign scientific diasporas.

We can safely say that the International Youth Summer School «Aerogels: from laboratory to industry has become traditional, the next event is planned for 2021.