Snow Cover, Atmospheric Precipitation, Aerosols: Chemistry and Climate

by N. Ianchenko, A. Sinitskaya, and I. Ognev

The third Baikal International Scientific Conference "Snow Cover, Atmospheric Precipitation, Aerosols: Chemistry and Climate" was organized by the Irkutsk National Research Technical University (INRTU https://www.istu.edu/news/61545/) and endorsed by IUPAC. The conference was planned to be held on 23-27 March 2020 in Listvyanka, but due to quarantine restrictions, it was postponed a year and took place 11-12 May 2021

The first Baikal International Scientific and Practical Conference, "Snow Cover, Atmospheric Precipitation, Aerosols: Climate and Ecology of Northern Territories and the Baikal Region" was dedicated to the Year of Ecology 2017 in Russia (26-29 June 2017). The second conference, "Snow Cover, Atmospheric Precipitation, Aerosols: Technology, Climate and Ecology" was held 25-30 June 2018. Both were held in the village of Khuzhir, Olkhon Island, Lake Baikal, Irkutsk region.

Since 2018, the Federal State Budgetary Institution Zapovednoye Pribaikalye (Irkutsk) has been providing active sponsorship, as well as scientific and organizational support for the conference. The industrial partner of INRTU and the conference is RUSAL - Bratsk.

The scientific and organizational goal of the conference was the creation of a platform at INRTU for discussing modern knowledge about the chemistry of snow cover, precipitation and aerosols under the influence of climate change; search for ways of cooperation.

It is known that about one-sixth of the world's population depends on snow melt water for agriculture and human consumption, while virtually the entire world's population benefits from maintaining the planet's heat balance, which is provided by the cryosphere. The study of snow cover is relevant for Russia, since for almost half a year, vast territories are covered with snow.

The main scientific directions of the conference were determined as: methods, means, methodology for studying the physical and chemical properties and composition of snow cover, atmospheric precipitation, aerosols; the influence of climate change, physical and chemical processes in the atmosphere and anthropogenic activity on the chemical composition of snow cover, precipitation, aerosols; modeling the study of climate change, chemical composition and physicochemical properties of snow cover, atmospheric precipitation, aerosols; the role of snow cover, atmospheric precipitation, aerosols in biogeochemical cycles and the cryosphere; chemical interaction of the oceans, the earth's surface and the biosphere with snow cover, atmospheric precipitation, aerosols; assessment of the impact of snow cover, atmospheric precipitation, aerosols on natural, socio-economic systems and human health. (http://snow-baikal.tw1.ru)

The chemical composition of the snow cover is determined by the influence of conjugated media, primarily atmospheric air, and the snow cover also affects the composition of the air.

Before the start of the conference, in March 2020, a collection of manuscripts was published. It contained 37 articles submitted by 63 authors. Among the conference participants there are scientists-researchers of the Russian Federation (Moscow, Arkhangelsk, Yekaterinburg, Irkutsk, Obninsk, Tomsk, Barnaul, St. Petersburg) and other countries, including Kazakhstan, China, and Japan.

The majority of articles are devoted to snow cover, followed by publications on precipitation and aerosols (http://snow-baikal.tw1.ru). The study of the chemical composition of the snow cover, atmospheric precipitation and aerosols, allows us to assume the composition of atmospheric air during the year and the factors affecting its composition.

At the opening ceremony on 11 May 2021, the representatives of the administration of INRTU, the sponsor, representatives of the organizing committee and the program committee, participants of the 2017 and 2018 conferences spoke. The conference was opened by the director of the Institute of High Technologies, Ph.D., Evgenii Antsiferov. In his greeting he emphasized the relevance of the topic, the need for cooperation between INRTU and other organizations, and wished the participants fruitful work. Evgenii Antsiferov spoke about the university's mission in the field of winter technologies, because the study of the phenomenon of winter and all accompanying, warning and subsequent events and processes affects the lives of people.

The next speaker was Shuhei Takahashi, Director of the Okhotsk Drifting Ice Museum (Hokkaido, Mombetsu, Japan), retired professor at the Kitami Institute of Technology (Japan), and former president of the Japan Snow and Ice Society. Takahashi thanked the Ministry of Science and Higher Education of the Russian Federation, the administration of INRTU, spoke about meetings with Russian scientists in 2018, announced the upcoming 36th International Symposium on the Okhotsk Sea & Polar Oceans 2022 in Mombetzu (http://okhotsk-mombetsu.jp/okhsympo/sympo-eng/top-page.html), and also wished good luck to the conference participants.

Head of the Program Committee and leading researcher Natalia Ianchenko made a short welcoming

presentation. She said that this conference was held due to the support of the administration of INRTU (rector Mikhail Korniacov https://www.istu.edu/eng/ob_irnitu/upravlenie), the work of the program committee, organizing committee and conference participants. The conference is dedicated to the chemistry of atmospheric precipitation, snow cover, aerosols under conditions of changing climate. She noted that the participants of previous conferences gave us a confidence in our interest in subsequent meetings, joint research and publications, in the mutual exchange of experience, knowledge and skills. It is possible that the conferences of INRTU will be relevant, like other long-term conferences of the Russian Federation with similar topics, such as the XVIII MNK "Aerosols of Siberia" (Tomsk), and the III International Symposium "Physics, Chemistry and Mechanics of Snow" (Yuzhno-Sakhalinsk).

Anatolii Baranov spoke on behalf of the program and organizing committees of INRTU. Baranov noted that highly qualified specialists with many years of experience in researching the chemical composition of the snow cover carried out research work on grants for industrial enterprises at INRTU.

Svetlana Babina, Deputy Director for Research of the Federal State Budgetary Institution "Zapovednoye Pribaikalye," as an active participant and co-organizer of the conference and a sponsor, greeted the conference participants.

Alexander Cherednichenko from Kazakhstan (KazNU, Almaty) said that "despite the current situation, the conference still took place, which speaks of our common desire to continue our research and, most importantly, share the results obtained with your colleagues, transfer our knowledge to students and all interested people. The geographical coverage of scientists from different countries shows a great interest in the topic of the conference. The existing challenges faced by humanity at the turn of the millennium cannot be solved without deep and high-quality scientific work that requires competent specialists, equipment and funds. It is not in vain that the conference is held within the walls of the university, allowing symbolic transfer of our knowledge to new researchers who study here. Ecology is inconceivable without the joint participation of all parties and all countries. And events like this conference can provide a worthy platform for communication and exchange of their research. This is one of the most important components of solving a problem, the ability to hear each other, understand and take a step to solve problems."

Greetings and wishes were heard from Kazakhstan scientist Azamat Madibekov (Institute of Geography and Water Safety, Almaty) and from Vladimir Makarov (Nizhny Novgorod State Technical University). Makarov said: "The topic of the work is a continuation of the work carried out in the Nizhny Novgorod Scientific and Practical School of Transport Snow Science. We trace our history since 1929. We recently celebrated our 90th anniversary. During the entire existence of our school, more than 1000 samples of transport and technological machines and complexes for moving on snow have been developed, ice, snow and frozen ground are being researched."

On the same day, eight scientific reports were presented:

- *The Role of Green Chemistry in Solving Environmental Problems: Responses to Global Challenges* Natalia Tarasova, Russian Academy of Sciences; IPUR RCTU; International Scientific Council (ISC). (The report can be viewed at https://scientificrussia.ru/articles/osnovopolagayushchij-zakon. Starts at 2 hours 56 minutes);
- *Contribution of Scientific Results to Societies from a Lecture in the U-Arctic Course in Greenland, 2019.* Shuhei Takahashi, Director of the Okhotsk Drifting Ice Museum (Hokkaido, Japan);
- *Chemical snow science* Ianchenko, INRTU, Irkutsk;

- *Process of Snow and Ice Tourism Creation,* Takafumi Fukuyama, Center for Advanced Tourism Studies, Hokkaido University, Sapporo, Japan;
- *Polycyclic aromatic hydrocarbons in the snow of Tyumen* D. Moskovchenko, Tyumen Scientific Center of the SB RAS, Tyumen;
- *Characteristics of the snow cover in Moscow, in the second half of the winter season 2020-2021 (on the example of Sokolniki Park)* A. Novikov, E. Kuznetsov, V. Litvinenko, Moscow State Pedagogical University, Moscow;
- *Experimental study of the physical and mechanical properties of snow-sand mixtures as a track bed for transport and technological machines,* V. Makarov, Nizhny Novgorod State Technical University, Nizhny Novgorod.

On the second day of the conference, the moderators were N. Ianchenko and I. Ognev. On this day, 11 reports were presented:

- *International Union of Pure and Applied Chemistry. IUPAC,* Ekaterina Lokteva, IUPAC Representative in the Russian Federation; Moscow State University, Moscow;
- *Determination of the dynamics and state of snow cover according to the NDSI and NDVI indices on the example of the Lipetsk region*, M. Movchan, V. Litvinenko, Moscow State Pedagogical University, Moscow;
- *Monitoring of snow cover and tendencies of changes in its characteristics on the territory of Russia,* N. Korshunova, RIHMI-WDC, Obninsk;
- *Chemical composition of atmospheric dust in winter as an indicator of the ecological state of urban areas (Western Siberia)* A. Talovskaya, Tomsk Polytechnic University, Tomsk;
- *Ionic composition of winter atmospheric precipitation in the city of Barnaul* T. Noskova, Institute of Water and Environmental Problems SB RAS, Barnaul;
- *Results of AAS measurements of atmospheric deposition of copper and lead in the snow cover of the Almaty agglomeration* L. Ismukhanova, Institute of Geography and Water Safety, Almaty, Kazakhstan;
- *The balance of hydrochemical and biological indicators in the under-ice water of Lake Baikal in the spring* Yu. Bukin, Limnological Institute SB RAS, Irkutsk;
- *Analysis and modeling of some characteristics of climatic changes in Central Siberia*I. Ognev, INRTU, Irkutsk;
- *Conjugate analysis of the particle size distribution of aerosol matter in the surface air and snow cover of the Tom-Obsk interfluve (observatory "Fonovaya") in the winter of 2018-19: the effect of air masses on the distribution of aerosol particle*D. Simonenkov, Institute of Atmospheric Optics SB RAS, Tomsk;
- *The elemental composition of dust aerosols in the vicinity of cement production based on the study of samples of the solid phase of the snow cover in Tomsk* D. Volodina, Tomsk Polytechnic University, Tomsk;
- *Atmospheric suspensions of the cities of the Far East* A. Kholodov, Far East Geological Institute, Far Eastern Branch of the Russian Academy of Sciences, Vladivostok.

Working group of the organizing committee of the III conference: (from left to right) Yu Bukin, a university postgrad, A. Sinitskaya, V. Arshinsky, N. Ianchenko, E. Antsiferov, and A. Baranov

Igor Ognev reported brief results of the conference and presented the composition of the working group of the organizing committee.

In total, 19 reports/presentations in Russian and English languages were presented, 23 participated, including 10 women. 41 co-authors contributed reports/presentations. Three countries participated in the 14 hours of live broadcast over two days. 20 organizations took part in face-to-face reports, including universities, research institutes and organizations. The Program Committee included eight men and eight women from three countries.

The participants presented their results by giving a presentation to other participants, received a participant certificate, diplomas for young researchers, published materials in the collection of 2020, sent papers in English to the IUPAC journal (papers were accepted until March 22, 2021).

The conference adopted a draft resolution containing the main decision: to hold the next IV conference in 2022.

The organizing committee of IRKUTSK NATIONAL RESEARCH TECHNICAL UNIVERSITY invites you and your organization's staff to take part in the preparation and work of the IV conference "Snow Cover, Atmosphetic Precipitation, Aerosols" in 2022.

The third conference was prepared for two years, initially as a visiting face-to-face, and then online, and was held thanks to the creativity of the main working group of the organizing committee: E. Antsiferov, N. Ianchenko (project curator, chairman of the program committee), A. Baranov, I. Ognev, A. Sinitskaya, V. Arshinsky, and Yu. Bukin.

The conference site http://snow-baikal.tw1.ru was developed by the Center for Software Engineering of INRTU. The site is maintained and supported by its head—V. Arshinsky.

The conference was held in the videoconference mode on the Zoom platform, with the technical support of the E-Learning Center of INRTU (headed by N. Lukyanov) and A. Podkorytov.

Please address on questions of training, cooperation and participation: snow-baikal@mail.ru; fduecn@bk.ru http://snow-baikal.tw1.ru/index-eng

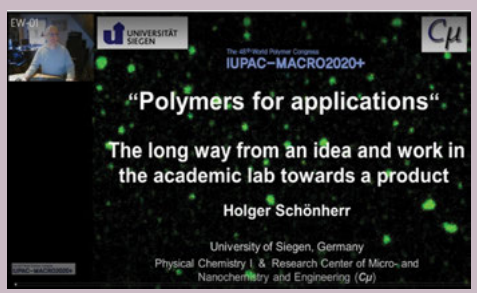
Educational Workshop in Polymer Sciences 2020+

by Melissa Chan Chin Han, Chris Fellows, Holger Schönherr, Per Zetterlund, and Jinhwan Yoon

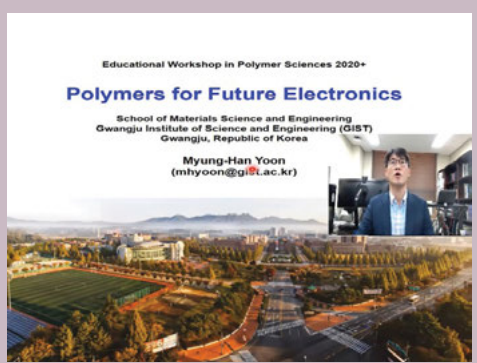
This interactive educational workshop on **polymers for applications** was organized for the first time using a virtual format in conjunction with MACRO2020+, Jeju Island. It was the fourth in a projected series of four workshops, covering synthesis, characterization, processing, and applications of polymers. All three lectures touched on the understanding of the basic science, terms and concepts that are critical to polymers for applications from designing the polymers for industrial applications. Thought-provoking insights into the optimization of molecular structures in relation to the properties and the potential / commercial applications were presented. Since MACRO2020+ was a hybrid conference, the pre-recorded educational workshop was structured. The participants left comments / questions on the workshop webpage and the instructors provided response on the webpage throughout the MACRO2020+ conference.

All lecture notes and videos are accessible from https://iupac.org/project/2019-022-1-400

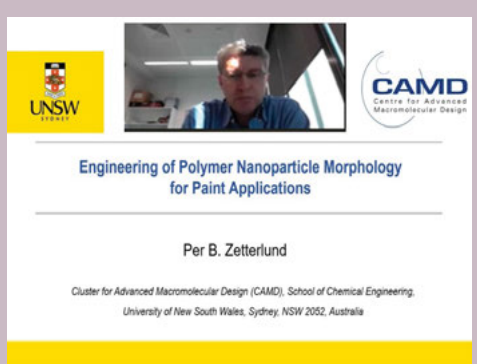
Pre-recorded lectures



Holger Schönherr, University of Siegen, Germany, *Polymers for applications—The long way from an idea and work in the academic lab towards a product*



Myung-Han Yoon, Gwangju Institute of Science and Technology, Korea, *Polymers for future electronics*



Per Zetterlund, The University of New South Wales, Australia, *Engineering of polymer nanoparticle morphology for paint applications*