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## 40 YEARS OF THE INSTITUTE OF CHEMISTRY AND CHEMICAL TECHNOLOGY OF SB RAS

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**Abstract:** Information on the organization and activities of the Institute of Chemistry and Chemical Technology of the Krasnoyarsk Scientific Center of the Siberian Branch of the Russian Academy of Sciences is presented. Its scientific directions are highlighted, the results of fundamental scientific and applied research, participation in the creation of technologies for deep processing of mineral and organic resources of Siberia, hydrocarbons and biomass, organization of the development of the scientific potential of the region, international cooperation are noted.

**Keywords:** coal chemistry, hydrometallurgy, multicomponent raw materials, physical and chemical analysis

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**On September 10, 2021, Krasnoyarsk hosted the celebration of the 40th anniversary of the Institute of Chemistry and Chemical Technology of the Siberian Branch of the Russian Academy of Sciences.**

The history of the institute began in 1977. To organize the Institute, the leadership of the SB RAS (academician G.I. Marchuk, academician G.K.Boreskov) invited the Doctor of Chemical Sciences Sergei Pavlovich Gubin, a well-known specialist in the field of coordination and organometallic chemistry, laureate of the USSR

State Prize, to the SB RAS. In the period 1978-1980, he carried out the necessary preparatory work and at the beginning of 1981 the establishment of the Institute was approved by the Decision of the Presidium of the USSR Academy of Sciences. The main task is to develop scientific foundations for solving important problems for the regions of Siberia associated with the deep processing of huge resources of mineral and organic raw materials. Currently, the Institute carries out research in two scientific areas: the physical and chemical foundations of new environmentally friendly metallurgical and chemical-technological processes for the complex extraction of target products from multicomponent raw materials and the physical and chemical foundations of the processes of deep processing of natural organic raw materials, including plant biomass and brown coal.

During the formation of the Institute, a personnel problem immediately arose: it was necessary to find highly qualified employees - doctors and candidates of sciences, specialists with higher and secondary technical education. And then S.P. Gubin and his team began to invite scientists from different cities of the country to

Krasnoyarsk: Moscow, Leningrad, Novosibirsk, etc. The teams and collectives formed at that time are still successfully developing technologies for processing mineral and organic resources.

Now the Institute employs 220 people, of which 100 are research workers (17 are doctors and 65 candidates of sciences), 35 people are young scientists and specialists under the age of 39. At present, the influx of young people is mainly made up of graduates of the Siberian Federal University and the Reshetnev Siberian State University. There are 17 full-time graduate students studying in graduate school, it is planned to create a joint magistracy with Reshetnev SSUST next year.

At the Institute the Doctoral Dissertation Council is successfully working, headed by Doctor of Chemical Sciences, Deputy Director for Scientific Work Nikolai Vasilyevich Chesnokov, in the specialties: physical chemistry, technology of inorganic substances, chemical technology of fuel and high-energy substances.

Initially, the strategy of the Institute in the 80s of the twentieth century was to strengthen cooperation with the "heavyweights" of non-ferrous metallurgy, the largest plants: Norilsk mining and metallurgical, Ust-Kamenogorsk lead-zinc, Balkhash mining and metallurgical, etc. Fundamental research was launched in the field of studying surface phenomena, extraction, sorption, leaching, followed by laboratory and pilot-industrial tests at large enterprises of the country. The first industrial introduction was the sorption extraction of platinum metals from spent electrolytes at the Uglich Watch Plant, then the extraction technology for extracting indium from solutions of zinc production (Chelyabinsk Zinc Plant), extraction schemes for the processing of cobalt raw materials (Norilsk MMC) and others. In 1985, as part of a team of co-authors, the Director of the Institute Anatoly Ivanovich Kholkin and his deputy Gennady Leonidovich Pashkov were awarded the USSR State Prize for the creation of a modern rare metal production at the Ust-Kamenogorsk lead-zinc. In 2008, for the creation and industrial application of new extraction processes and combined hydrometallurgical schemes for the processing of unconventional and

technogenic raw materials and industrial products of the production of rare and non-ferrous metals, as part of a team of co-authors, four employees of the Institute were awarded the prize of the Government of the Russian Federation. The Government Prize was awarded to: Director of the Institute, Corresponding Member of the Russian Academy of Sciences, Doctor of Technical Sciences Gennady Leonidovich Pashkov, Head laboratory, d.ch.s. Vladimir Ivanovich Kuzmin, Head laboratory, Ph.D. Viktor G. Samoilov, Leading Researcher, Ph.D. Isaak Yurievich Fleitlich.

Fundamental research in the field of deep processing of coals of the Kansk-Achinsk basin was started by Doctor of Chemical Sciences, prof. S.P. Gubin in close cooperation with KATEK NiiUgol. Subsequently, research in the field of processing coal and wood raw materials at the Institute developed under the leadership of Doctor of Chemical Sciences, prof. Boris Nikolaevich Kuznetsov. The scientific foundations of new effective technologies for thermocatalytic processing of Kansk-Achinsk coals in apparatus with a catalytic fluidized bed were developed. Together with the Institute of Catalysis of the Siberian Branch of the Russian Academy of Sciences and SibVTI, in 1984, a pilot industrial boiler with a fluidized bed furnace was launched, on which the technology of catalytic coal combustion was successfully tested. For his great contribution to the scientific support of the development of KATEK B.N. Kuznetsov was awarded the Order of the Badge of Honor in 1986.

Research in the field of deep processing of renewable wood raw materials is aimed at creating integrated technologies that ensure the transformation of all the main components of woody biomass into a range of in-demand products. The relevance of this topic has sharply increased in recent years, since the processing of biomass into energy carriers and chemical products does not affect the balance of carbon dioxide in the atmosphere and does not aggravate the greenhouse effect. The most important scientific achievements in this area are associated with the development of new catalytic processes for the conversion of woody biomass into valuable chemical products,

biofuels, and functional polymers. The head of these works, Doctor of Chemical Sciences, prof. B.N. Kuznetsov was awarded the honorary title "Honored Scientist of the Russian Federation" in 2008.

The Institute actively participates in international cooperation, was the organizer of 4 international symposia on catalytic transformations of natural polymers.

Over the past years, more than 90 candidate and 28 doctoral dissertations have been defended in the focus scientific areas.

The staff of the Institute are constantly in scientific search, making a worthy contribution to the development of fundamental science. The Institute is actively developing its scientific potential – it follows the path of expanding its own scientific schools, international contacts, exchange of leading professors and specialists. Fundamental scientific research carried out at the Institute is supported by projects of federal target programs, the Russian Science Foundation, the Russian Foundation for Basic Research, the Krasnoyarsk Science Foundation, etc. More than 500 articles published by the Institute staff over the past 5 years are included in the Web of Science database, received 53 patents.

Applied research also does not stand aside. The developments of the ICCT SB RAS are known and used in the Krasnoyarsk Territory, in Russia. The Institute actively cooperates with enterprises of the real sector of the economy, such as PJSC "MMC"Norilsk nickel", PJSC Chelyabinsk Zinc Plant, JSC "Kras mash", JSC Krastsvetmet, Federal State Unitary Enterprise "Mining and Chemical Combine", enterprises of the timber industry complex of the Krasnoyarsk Territory.

The successful development of fundamental and applied science at the Institute is facilitated by the creation at the KSC SB RAS in 2001 of the Krasnoyarsk Regional Center for Collective Use (KRCKP SB RAS) under the leadership of Doctor of Chemical Sciences, prof. Anatoly Ivanovich Rubailo. In the rating of Shared Use Centers (CSC) organized by the Federal Agency for Scientific Organizations of the Russian Federation, the KRCKP SB RAS became one of

the leading CSCs in Russia, which made it possible to win FTP grants for the purchase of the latest devices and equipment in the amount of about 460 million rubles over the past four years. At the present time, only in our Institute there are more than 15 instruments of the first line of world instrument making, and in the CRCKP FRC KSC SB RAS – more than 50, which our scientists can use in their research.

Much attention is paid in the Institute and scientific and organizational activities: fruitful international cooperation, the development of ties with industry and university science, participation in expert councils, editorial boards of leading scientific journals. 29 employees are engaged in teaching activities, on the basis of the Institute, the basic departments of SibFU are organized. The Institute supervises in the city of Krasnoyarsk the basic school of the Russian Academy of Sciences – MAOU Lyceum №7. Scientific direction of profile classes "Environmentally friendly and resource-saving energy, effective deep processing of renewable natural raw materials to obtain a wide range of demanded chemicals". Classes for schoolchildren are conducted by young employees and graduate students of the Institute: Ph.D. Yuri Malyar, Ph.D. Dmitry Kuzmin, Ph.D. Sergey Vorobyov, Ph.D. Dmitry Zimonin under the supervision of the Director of the Institute, Doctor of Chemical Sciences, prof. RAS Oxana Pavlovna Taran.

The Institute is the organizer of significant scientific events. For many years he participated in the organization and holding of the international Congress "Non-ferrous metals and minerals" in the city of Krasnoyarsk. This year the international XIV conference "Metallurgy of non-ferrous, rare and noble metals", preceding the anniversary celebration and dedicated to the 40th anniversary of our Institute of Chemical Chemistry of the SB RAS, was organized jointly with the Institute of Non-Ferrous Metals and Materials Science of the Siberian Federal University and was held on-line from September 6 to September 9. Scientific adviser: Academician of the Russian Academy of Sciences Anatoly Ivanovich Kholkin, I.I. NS. Kurnakov RAS, Moscow, Chairmen of the Organizing



*Sergey Pavlovich Gubin - Director-organizer of the Institute of Chemical Chemistry SB RAS and Oxana Taran – the present director at the anniversary of the Institute on September 10, 2021.*

Committee: Doctor of Chemical Sciences, prof. Natalya Vasilievna Oleinikova and Doctor of Chemical Sciences Vladimir Ivanovich Kuzmin. More than 60 people took part in the work of the Conference, 40 reports of scientists and specialists from the Russian Federation, Kazakhstan and Uzbekistan were heard. The conference showed the importance and undoubted interest of representatives of the scientific and technological communities in solving the problems of processing mineral raw materials, scientific and technical achievements in this area. From September 29 to October 2, the Institute was host the 5th School of Young Scientists "New catalytic processes for deep processing of hydrocarbons and biomass." Scientific adviser, RAS Academician Valentin Nikolaevich Parmon, IC SB RAS, Novosibirsk,

Chairman of the Organizing Committee, Doctor of Chemical Sciences, prof. RAS Oxana Pavlovna Taran. The topic includes various fundamental and applied aspects of deep processing of oil and gas, coal, plant, microbiological raw materials and organic waste and is supported by the Russian Science Foundation.

Scientists from different cities of the country came to congratulate their colleagues at the jubilee Scientific Council. Guests from Moscow, Novosibirsk, St. Petersburg, colleagues from the Institutes of the Federal Research Center of the KSC SB RAS and universities of Krasnoyarsk in their speeches noted the value of joint interdisciplinary research and congratulated their colleagues.

Of particular interest was the report of the director-organizer of the Institute, Doctor of Chemical Sciences, Professor, Full Member of the Russian Academy of Natural Sciences Sergei Pavlovich Gubin. He told about the history of the Institute, colleagues of scientists who in the 80s of the twentieth century took an active part in translating the ideas that were born into reality, about the difficulties that had to be overcome at that time, and presented books as a souvenir. S.P. Gubin wished the staff of the Institute to continue to be constantly in scientific search, to make a worthy contribution to the development of fundamental science.

We can rightfully be proud of the pages of the Institute's biography, the names of those who stood at the origins of its creation and who ensure its authority and relevance today.

