Кирилл Викторович Ковтунов

(14.01.1983 – 19.05.2020)

Скоропостижно скончался доктор химических наук, ведущий научный сотрудник Лаборатории магнитно-резонансной микротомографии Института «Международный томографический центр» Сибирского отделения РАН Кирилл Викторович Ковтунов. Он работал в Томографическом центре со студенческих лет, там в 2008 г. защитил кандидатскую диссертацию "Индуцированная параводородом поляризация ядерных спинов в реакциях гетерогенного каталитического гидрирования", а в 2019 – докторскую диссертацию «Индуцированное параводородом усиление сигнала ЯМР в гетерогенно-каталитических процессах».

Кирилл Викторович был обладателем многочисленных научных наград для молодых ученых, в том числе обладателем аспирантской стипендии фонда им. К.И. Замараева и победителем конкурса работ молодых ученых в области магнитного резонанса в химии издательства John Wiley & Sons (подробнее см. https://www.tomo.nsc.ru/structure/lab/lmmt/dost/). Он останется в памяти коллег молодым, но глубоким и зрелым специалистом. Краткий анализ направлений исследований К.В. Ковтунова можно найти в приведенном ниже некрологе, опубликованном в Bulletin du Groupement d'informations mutuelles AMPERE No 279/280 <69(2-3)>, 14-17 (2020) https://www.ampere-society.org/bulletins/AmpereBulletin279-280.pdf.

Dr. Kirill V. Kovtunov

(14.01.1983 – 19.05.2020)

Kirill's scientific career started in 2003 when, as a chemistry student at the Novosibirsk State University (NSU), he came to the International Tomography Center (ITC), SB RAS, to work on his diploma thesis. He was engaged in comparative studies of liquid and gas flow in complex geometries such as intersecting channels and microreactors using magnetic resonance (micro) imaging techniques. After successfully graduating from NSU in 2005, he joined the MR microimaging laboratory at ITC as a PhD student. From then on, his research was about combining magnetic resonance, catalysis, and parahydrogen. The primary objective of his PhD thesis was to demonstrate parahydrogen-induced polarization (PHIP) effects with the use of heterogeneous catalysts, as opposed to PHIP in homogeneous systems which by then was a well-established research field. To say that the task that he faced was challenging would be an understatement – a common perception at that time was that observation of PHIP effects in heterogeneously catalyzed reactions (HET-PHIP) would be impossible. Yet, in the history of scientific research in general, and magnetic resonance in particular, there are many examples of "impossible" things becoming a reality, with magnetic field effects in chemical reactions being one excellent illustration. HET-PHIP became yet another such example, first demonstrated with the use of transition metal complexes immobilized on porous or polymeric supports in 2007, and then successfully, and rather unexpectedly, extended to supported metal nanoparticles. This latter achievement has opened an entirely new dimension for parahydrogen-based research, demonstrating its applicability not only for the production of catalyst-free hyperpolarized liquids and gases for potential biomedical applications, but also for addressing challenges of modern fundamental and industrial catalysis which is largely dominated by heterogeneous processes. Based on these novel and significant results, Kirill defended his PhD thesis entitled "Parahydrogen-induced polarization of nuclear spins in heterogeneous catalytic hydrogenation reactions" in 2008 and became a full-time researcher at ITC.

In subsequent studies, the scope of HET-PHIP was expanded significantly. HETPHIP effects, initially observed with immobilized metal complexes and supported metals, were eventually demonstrated for a wide variety of catalyst types, including supported and bulk metal oxides, sulfides, and carbides. The effects of the variation of the type of metal, support, catalyst preparation and pretreatment, of metal-support interactions as well as substrate types on PHIP effects was explored, and mechanisms and kinetics of some important catalytic processes were considered. The most recent efforts addressed single-atom and single-site heterogeneous catalysts prepared using surface organometallic chemistry as well as single-site bimetallic systems, the trends that became popular recently in modern catalytic research and practice. In addition to PHIP studies, Kirill was active in the development and applications of another parahydrogen-based hyperpolarization technique termed SABRE, including the extension of its scope to novel substrates, and development of its heterogeneous version. Significant attention in his work was devoted to extending spin polarization lifetime via transfer to heteronuclei and by exploring and exploiting the properties of long-lived spin states, to developing approaches for production of catalyst-free biocompatible contrast agents for in vivo MRI, and to application of the developed hyperpolarization techniques to MR imaging of operating catalysts and model reactors in the operando regime. Kirill's contribution to the field is certainly crucial, yet all this would have been hardly possible without a vast network of contacts and collaborations at the national and international level that he participated in, starting from the joint grant with the group of Alex Pines at UC Berkeley that resulted in the very first observation of heterogeneous PHIP effects, and gradually expanding over the years to include researchers and teams in the Netherlands, the US,

Switzerland, Spain, Germany, Finland, France, Italy, UK, China, Japan, and a number of teams in Russia, including a long-term collaboration with many researchers at the Boreskov Institute of Catalysis in Novosibirsk. Kirill was also a very passionate teacher, who deeply cared about the careers of his trainees. He supervised a number of graduate and undergraduate students, and three Ph.D. students he trained now successfully continue their careers in science. He always was eager to orchestrate the exchange visits for his trainees to enrich their scientific experience and provide meaningful training that would lead to accomplishments and breakthroughs. While the load of research-related work and responsibilities he had to carry was rather heavy, Kirill nevertheless managed to find time for a short break in the midst of his busy schedule to enjoy his favorite outdoor activities including hunting and fishing.

Kirill coauthored over 100 peer-reviewed papers and book chapters (h=28), 41 of which became the solid basis for his habilitation (Dr. Sci.) thesis which he defended on December 25, 2019, a major milestone in one's scientific career. He was eager to finalize all defense-related formalities as soon as possible so that he could start a new chapter in his scientific research career and embark upon exploring new ideas and addressing novel challenges, with his research interests extending to in vivo applications of PHIP-based hyperpolarized metabolites and gases, enrichment of nuclear spin isomers of polyatomic molecules, application of hyperpolarized noble gases, and more. He was full of energy and enthusiasm, and the future looked bright and promising - or so it seemed. About two weeks later he was diagnosed with cancer. And despite his unwavering resolve to fight the illness, and significant progress with the treatment, he passed away on May 19, 2020, at the age of 37. He was awarded the Young Scientist Prize at the 16th International Congress on Catalysis (ICC 16) in Beijing, China, for the exceptional results presented at the Congress (2016); the Medal of the Russian Academy of Sciences with the Prize for young scientists (2015); the first-degree diploma of the laureate of the personal award of the administration of the Novosibirsk Region for young scientists (2009); and John Wiley & Sons 2008 Magnetic Resonance in Chemistry Award for Young Scientists at the Euromar meeting (2008). He was also the winner of the competition for grants of the President of the Russian Federation for state support of young Russian scientists - candidates of science (2010, 2013) and the winner of the Zamaraev International Charitable Foundation Prize / scholarship for PhD students (2008). With his wife Larisa, he was raising two kids, son Artem and daughter Tatyana. For them, for his parents, and the entire extended family this is a tragic and devastating blow beyond imagination. This is also a tremendous loss for the group, for the graduate and undergraduate students he supervised, and for his numerous colleagues and friends all around the world.

We have lost a valued colleague, a reliable partner, and a personal friend. We'll miss his openness, amiable nature, and infinite enthusiasm. And we'll remember him. Always.

Igor Koptyug, Eduard Chekmenev, Boyd Goodson, Valerii Bukhtiyarov

Kirill (right) receiving the John Wiley & Sons Award for Young Scientists from Prof. Geoffrey Bodenhausen (left) at the Euromar 2008 meeting in St. Petersburg

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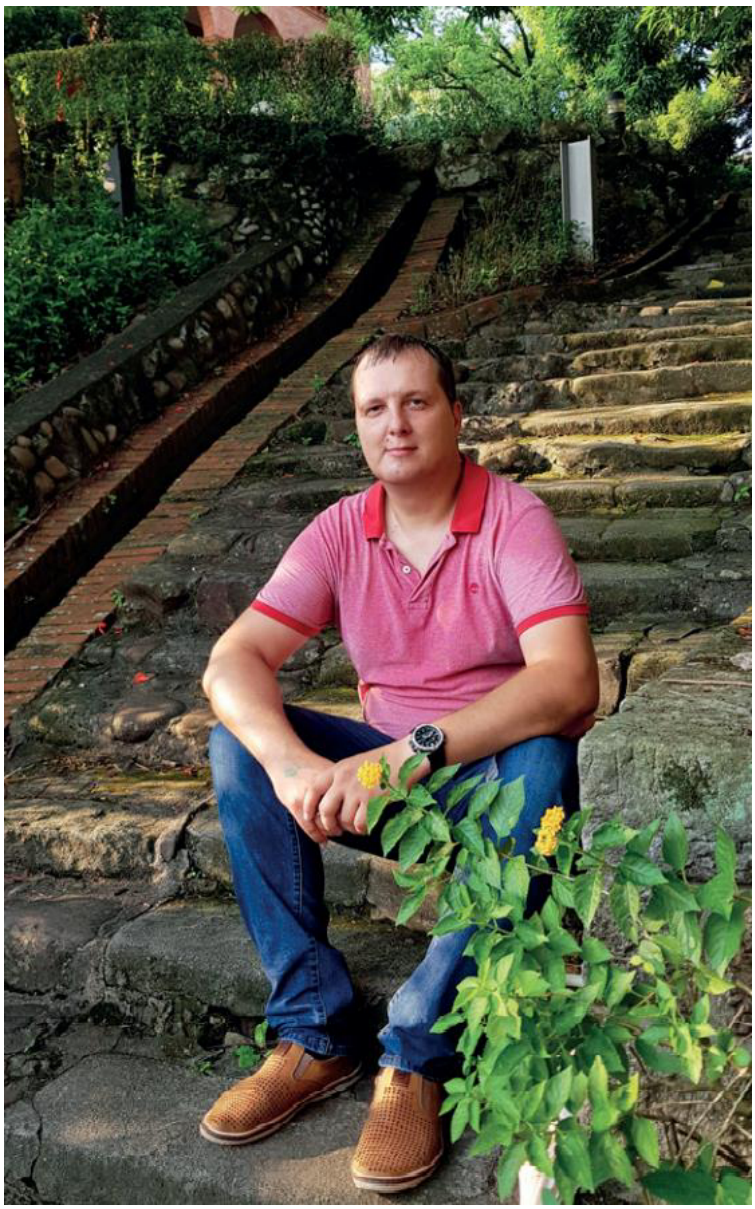

Kirill was an accomplished world-traveler; this photo shows him during a sight-seeing trip to fort San Domingo, New Taipei, while visiting research partners in Taiwan in 2019

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Outside of the lab, Kirill was an avid hunter and fisherman; photo shows Kirill after a successful ice-fishing trip at the artificial Ob lake in Novosibirsk.

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https://www.gofundme.com/f/kirill-kovtunov039s-family-donation

https://twitter.com/mmt_lab/status/1265553640787410945

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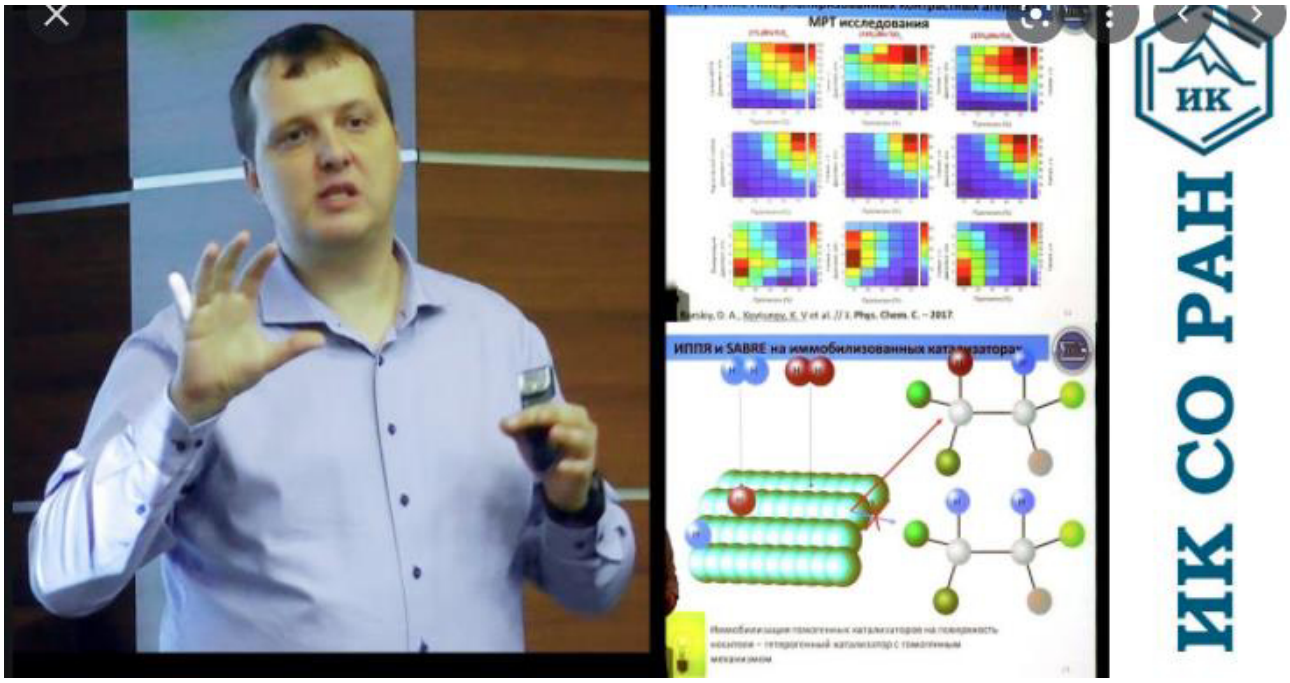
Видеозапись заседания диссертационного совета в ИК СО РАН 25 декабря 2019 г. - защита диссертации Ковтунова Кирилла Викторовича на соискание ученой степени доктора химических наук по специальности "физическая химия"



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