

activity and stability optimization. He has identified one of the first-ever sets of stability design principles for preventing catalyst degradation in acid, where modulating the electronic structure of transition metal oxides and nitrides stabilizes them against dissolution in acidic electrolytes. Furthermore, he has shown that tuning the electron-withdrawing capability of heterometal substituents in transition metal oxide catalysts can optimize their bonding properties, reaction barriers, and catalytic activity for boosting electrochemical water splitting to produce hydrogen fuels. Such principles highlight a physically meaningful framework with quantitative predictive power for accelerating catalyst design to combat the most recalcitrant, urgent societal challenges in sustainability and decarbonization, including climate change, environmental pollution, energy poverty, and food insecurity. Follow his work at <https://orcid.org/0000-0003-3696-770X>

Zhe Zhuang works on advancing the field of C–H functionalization reactions of native substrates using practical oxidants and catalysts. He has developed a range of C(sp³)–H functionalization reactions that utilize inexpensive and industry-compatible oxidants, namely tert-butyl hydrogen peroxide and sodium percarbonate, with the potential for large-scale manufacturing. In contrast to traditional multi-step synthesis approaches, his methodologies enable the streamlined, one-step synthesis of biologically significant scaffolds from readily available starting materials, such as aliphatic carboxylic acids and amines. The utility of these protocols has been demonstrated through their applications in late-stage functionalization of natural products and pharmaceutical compounds, as well as in total synthesis endeavors. For example, he has developed a method for the direct synthesis of β -lactones from readily available aliphatic acids. This approach yields a versatile intermediate for constructing diverse compound library in medicinal chemistry and serving as a covalent warhead in drug discovery. The use of inexpensive and practical tert-butyl hydrogen peroxide in water, combined with the ease of product purification without the need for column chromatography, render this reaction scalable and potentially amenable to tonne-scale manufacturing.

The IUPAC-Zhejiang NHU International Award, managed by the ICGCSD, is presented every two years.



Look for the announcement of the next call in 2024 ahead of the 2025 IUPAC World Chemistry Congress that will take place in Malaysia. For further information about the IUPAC-Zhejiang NHU International Award, see <https://iupac.org/what-we-do/awards/>.

Empowering Future Chemists: IChO and IUPAC Work together to Inspire New Chemistry Vocations

The 55th edition of the International Chemistry Olympiad (IChO) was held from 16–25 July 2023 in Zurich, Switzerland. The alpine country hosted the competition for the first time, bringing together 350 students from 89 different countries. Despite the competitive spirit, the friendship among all participants was the main characteristic of this international event. The IChO is an annual competition for some of the most talented secondary school chemistry students. Participating countries send a team of four students who compete in two separate exams, a practical laboratory exam and a written theoretical exam. The mission of the IChO is to promote friendly relations between young people from different countries, encouraging cooperation and international understanding. Indeed, the IChO 2023 had a very fitting motto: “Let’s find solutions together!”

IUPAC is a long-standing partner of IChO. In 2007, the two organizations signed a Memorandum of Understanding (MoU). IUPAC provides some financial support to enable the participation of students from low-income countries and to contribute to the promotion of IChO’s goals and activities. The MoU was renewed in May 2022 which ensures the continuation of the strong partnership between these two international chemistry organizations that share not only their commitment to inspiring and empowering young students, but also their passion for chemistry, education, and international cooperation.

During the first two days of IChO 2023, the students explored the beautiful city of Zurich and the ETH (Swiss Federal Institute of Technology), where the exams were held. The initial shyness on the first day vanished as the participants engaged in enjoyable activities together. The environment in the student hotel was also lively. The building’s clubhouse was packed with people chatting, playing games and, of course, solving chemistry problems! The exams lived up to their reputation of being challenging, leading to high nerves before the first exam. The competition included a total of 5 hours of practical



Some of the students who took part in the IChO 2023 and IUPAC President, Prof. Javier García Martínez, during the visit to Lucerne.

lab exercises and 5 hours of theoretical problems, covering various topics from organic chemistry to physical chemistry. A real chemistry marathon over two days that required all participants to give their best.

For the participants, IChO 2023 was a unique opportunity to make new friends that share their passion for chemistry and discover new places in Switzerland. Carmen Fuentes Campos, a student from Sevilla, Spain, was very positive about the Olympiad: "As an IChO participant, this experience has not only allowed me to test myself by putting my knowledge into practice in the different tests, but also to realize how much I still have to learn. This has really increased my interest to get to the deepest and most complex part of chemistry and to become a researcher in the future to go as far as possible. It was a life-changing experience that many of these students will never forget."

The IChO 2023 was possible through the efforts of 300 volunteers, including team guides, mentor guides, exam authors, scientific assistants, and the members of the scientific committee. They were always recognizable by their colourful T-shirts. These volunteers embodied the best part of the IChO: generosity and hope for the next generation of chemists. They skilfully managed and maintained a tight schedule throughout the 10-day event, which is no small feat when coordinating over 600 people, while the scientific committee not only put together the exams, but also managed to correct them in record time.

In addition to the exams, the participants had the opportunity to explore the country during the week-end. On Saturday, they visited Lonza in Visp, where they learned how chemistry helps to improve our daily health. In the afternoon, they went on an exciting self-guided tour of Bern. As you would expect in Switzerland, there was also a chocolate tasting on the train between Visp and Bern. A delicious trip! On Sunday, they visited Lucerne, crossed the lake by boat, and climbed Mount Rigi for a spectacular view. There, IUPAC President Javier García Martínez addressed all participants, telling them how they can help create some of the solutions we need to address our most pressing challenges, and how we at IUPAC are working to provide the chemistry community with the resources, data, and standardized methods to accelerate chemical discovery, improve chemistry education, and make science more impactful, useful, and inclusive.

On Monday, 24 July, the Tonhalle concert hall in Zurich was filled with hundreds of students eager to find out if they would be awarded one of the 2023 IChO medals. A wave of excitement and friendship filled the air as national flags flew in the recently restored hall. It was clear to all in attendance who heard the shouts of support for the medallists that friendship, not competition, was the star of the IChO 2023 Closing Ceremony. For those who received a gold medal, IUPAC President Javier García Martínez presented them with a signed IUPAC Periodic Table, which they will surely treasure for years to come.



IChO 2023 Closing Ceremony at the Tonhalle Concert Hall; gold medalists fly their flags as all participants show their support.

IUPAC and the International Chemistry Olympiad have joined forces to promote new vocations in chemistry. The importance of this mission cannot be overstated. By promoting excellence and recognizing talented students, the IChO inspires the next generation of chemists to pursue careers in this vital scientific field. Encouraging young people to explore and embrace chemistry is paramount, as it lays the foundation for future discoveries and innovations that can address pressing global challenges ranging from sustainable energy solutions to environmental protection and medical breakthroughs. The combined efforts of IUPAC and IChO contribute significantly to the advancement of chemistry and its critical role in shaping a better and more sustainable world for generations to come. Let's meet again at the 56th International Chemistry Olympiad in Ryad, Saudi Arabia, in July 2024.

<https://www.icho2023.ch/>

Report prepared by Victor Sabanza <victor.sabanzagil@epfl.ch> a PhD candidate at the École Polytechnique Fédérale de Lausanne (EPFL) and a volunteer during the IChO 2023 in Zürich.

WorldFAIR month 12 deliverables

In June 2023 CODATA announced that all the WorldFAIR month 12 deliverables have been submitted to the EC HORIZON agency and are available in their Zenodo community:

- WorldFAIR Project (D3.1) Digital recommendations for Chemistry FAIR data policy and practice: <https://doi.org/10.5281/zenodo.7887283>

This report reviews some of the critical and persistent issues around documentation of chemical information. These were identified through a series of webinar panels on the theme: "What is a chemical?", and through other conferences, workshops, and ongoing collaborative projects run as part of the WorldFAIR project and IUPAC (the lead organisation of WP03). See IUPAC Project 2022-012-1-024

- WorldFAIR Project (D4.1) Nanomaterials domain-specific FAIRification mapping: <https://doi.org/10.5281/zenodo.7887341>
- WorldFAIR Project (MS6) Geochemistry Scientific Content Component: <https://doi.org/10.5281/zenodo.7977116>
- WorldFAIR Project (D7.1) Population Health Data Implementation Guide: <https://doi.org/10.5281/zenodo.7887385>
- WorldFAIR Project (D8.1) Urban Health Data – Guidelines and Recommendations: <https://doi.org/10.5281/zenodo.7887523>
- WorldFAIR Project (D9.1) Data standard for sharing ecological and environmental monitoring data documented for community review: <https://doi.org/10.5281/zenodo.7849241>
- WorldFAIR Project (D12.1) Disaster Risk Reduction Case study report: <https://doi.org/10.5281/zenodo.7887557>