

Conference Call



Group photo taken during the closing ceremony of the 39th ICSC 2025

Solution Chemistry

by Jalel Mhalla

From 14-17 September 2025, the **39th International Conference on Solution Chemistry** (39ICSC) was held for the first time in Africa and the Arab world at the Rosa Beach Hotel in Monastir, Tunisia. Endorsed by IUPAC, it was organized with the support of the University of Monastir and the Tunisian Chemical Association (ACT) as co-organizer. As Chair, I am pleased and honored to provide in this report an overview of the history and objectives of the ICSC, as well as the key scientific work and advances presented during this event, with some remarks and recommendations.

History

The International Conference on Solution Chemistry (ICSC) has a fairly long history. It was around 1965-1966 that the founding professors—Ron Gillespie (Canada), Cliff Addison (England), Viktor Gutmann (Austria), and Alex Popov (USA)—launched the idea of organizing a summer school in May 1967, with financial support from NATO's scientific branch. The school was held on the campus of McMaster University in Hamilton, Canada, and aimed to discuss various topics in the chemistry of non-aqueous solutions. This symposium was considered the first International Conference on Non-Aqueous Solutions (ICNAS), organized every two years under the auspices of the IUPAC, successively in England (three times), the USA (twice), Austria, Canada, Germany, France, and Belgium, until 1986.

Meanwhile, the renowned professors Harold L. Friedman and Frank H. Stillinger contributed to the creation, around 1970, of the biennial «Gordon Conference on Water and Aqueous Solutions,» which is still held at Holderness School, Plymouth, NH, USA. On the European side, Professor Georges Carpeni (University of Marseille, France) founded the International Society for the Study of «Solute-Solvent-Solute Interactions,» which

held its first meeting in September 1972 in Marseille, followed by two meetings in 1974 and 1976 in Belgium and Poland. The fourth conference was held in Vienna in 1978 as the «4th International Symposium on Solute-Solvent-Solute Interactions,» considered the first in a series of conferences focusing primarily on the aqueous phase, known as IS4I, sponsored by IUPAC. Consequently, two major international conferences on solution chemistry, IS4I and ICNAS, were held in the same year in two different European countries, and this continued until 1980, when a new joint International Steering Committee was established to manage both series of meetings. As a result, the 6th IS4I was moved to Osaka, Japan, in 1983. Subsequently, ICNAS and IS4I were able to meet alternately between 1982 and 1987.

An agreement to merge ICNAS and IS4I into a single, universally recognized International Conference on Solution Chemistry (ICSC) was reached in 1985 at the 7th IS4I in Reading. Bernard Gill of the University of Leeds served as the first chair of the ICSC's



Attendees at the opening ceremony, including the president of the University of Monastir 39ICSC, the Dean of the Faculty of Sciences of Monastir, the President of the Tunisian Chemical Society, and Chair of the 39th(ICSC).

International Steering Committee. The first combined conference was the 19th ICSC, held in Lund, Sweden, in August 1988.

Subsequently, ICSC meetings were held annually until 1991, after which they became biennial. At the 27th ICSC in Vaals in 2001, Ingmar Persson (Swedish University of Agricultural Sciences, Uppsala, Sweden) assumed the chairmanship. At the 35th ICSC in Szeged in 2018, the chairmanship was transferred to Toshio Yamaguchi (University of Fukuoka, Japan). On 26 August 2025 the members of ISC designed Yongquan Zhou (Roger) (Qinghai Institute of Salt Lakes, Chinese Academy of Sciences, Xining, China) as the current Chair of the International Steering Committee.

The 36th ICSC took place in 2019 in Xining, China. The 37th ICSC was postponed from 2021 to 2022 due to the global COVID-19 pandemic; it was held online in Cartagena, Colombia, and the 38th ICSC took place in 2023 in Belgrade, Serbia. Tunisia's bid to host the 39th ICSC was a long and determined process, and it was only in Xining, China that it was accepted in 2019 and confirmed in 2023 in Belgrade.

Fundamental Objectives and Applications

Fundamentally, solution chemistry is generally concerned with the relationship between the structures and properties of mixtures in the liquid phase at different scales (macroscopic, mesoscopic, molecular, and atomic). This relationship is governed by all the interactions between the particles in solution, particularly solute-solvent interactions. The solution can be aqueous or organic.

As for the properties, they relate to various physico-chemical processes, such as solidification, evaporation, and boiling; but especially the solubility of solutes and their dissolution process; as well as the electrolysis of the solvent and solutes.

Strong interactions and molecular collisions can also give rise to different types of reactions followed by equilibria in solution (redox, acid-base, complexation, or precipitation reactions), characterized by an exchange of particles (electron, proton, ligand, or ion) in a donor/acceptor pair. More recently, solution chemistry has increasingly focused on the formation processes of nanoparticles such as colloids, micelles, supramolecular, *etc.*, as well as their structures, properties, and applications.

Solution chemistry has always played an important role in the chemical industry, particularly in extraction, separation, and valorization processes, as well as in improving analytical methods. Currently, it is becoming increasingly involved in the pharmaceutical and



Each speaker received a certificate of participation to the 39ICSC 2025 and a souvenir prize.

medical fields, green chemistry, and environmental protection in general.

Evolution and Scientific Advances

From a scientific perspective, ICSCs perfectly illustrate the complete abandonment of the old rigid compartmentalization between disciplines. Indeed, solution chemistry is a vast and interdisciplinary field that draws upon chemistry, physics, and biology, as well as pharmaceutical and medical sciences. The objective is to achieve, through the synthesis of this knowledge, a better understanding of the various processes in liquid solutions, which in fact constitute more than 70 % of the composition of the Earth and living organisms.

In particular, the 39th ICSC, which in 2025 brought together approximately 150 participants from five continents (37 countries), featured five plenary lectures and 13 keynotes presented by world-renowned professors, as well as 45 oral presentations in three parallel sessions and 65 posters in three sessions. The 39th ICSC provided an opportunity to delve deeper into and exchange ideas on 14 themes, demonstrating how the extension of solution chemistry to interface chemistry, polymer chemistry, and supramolecular chemistry has led to significant innovations in analytical chemistry, coordination chemistry, and the field of nanocomposites.

Furthermore, the development of computational and molecular dynamics calculations, combined with computational chemistry, quantum computing and their application to the latest spectroscopic techniques at different scales, has enabled a better qualitative and quantitative description of structures and dynamics in solution, particularly in the case of complex solutions, supercritical solutions, ionic liquids, and deep eutectic

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solvents, thus paving the way for various new applications in diverse fields.

To cite just a few examples of applications, we can mention:

- Progress in fundamental research and key technologies for optimal valorization through selective extraction of brine chemical resources (Li, Cs, Rb, etc.), as well as prospective research on the integrated production of salt lakes and salt chemical industries.
- Progress in separation chemistry at various scales, aimed at separating elements from natural resources (rare earths, uranium, etc.) or waste for recycling.
- The development of selective polymer inclusion membranes for new separation applications, including water purification and selective metal recovery, based on molecular recognition and coordination.
- Advances in analytical chemistry in the field of nano-modified sensors.
- Advances in organometallic chemistry, particularly in the field of homogeneous nano catalysis.
- The design of efficient drug delivery systems incorporating co-encapsulation techniques for bioactive compounds.
- The technologies and applications of supercritical fluids for the synthesis and targeted modification of materials and composites.
- Applications of quantum dots and carbon dots in various nanotechnology.

More details are given in the Proceedings of the 39ICSC.

Conclusion

Both scientifically and culturally, the 39th ICSC-2025 contributed to perpetuating the tradition of promoting scientific and cultural interaction between different research communities worldwide. This, in particular between countries of the North and South, in order to share their latest discoveries, both fundamental and practical, to guide new generations, and to disseminate their knowledge and technological innovations for the benefit of society and environmental protection.

Furthermore, the 39th ICSC-2025 provided an opportunity for the IUPAC Subcommittee on Solubility and Equilibrium Data (SSED), chaired by Slobodan Gadzuric (Univ. of Novi Sad, Serbia), to hold its annual meeting concurrently.

For more information, readers can visit the 39th ICSC website: <https://www.sctunisie.org/icsc2025/>, and



The best poster award is presented at the 39ICSC 2025 to Jing Ma and Zhiwu Yu, Department of Chemistry, Tsinghua University, Beijing, China.

consult the Conference Program and Proceedings.

Finally, a special issue of the *Springer Nature—Journal of Solution Chemistry* will be dedicated to publishing all the contributions (Conferences, Oral communications and Posters) presented at the 39th ICSC-2025 (collection presented at <https://link.springer.com/collections/ebgdcfmad>). To encourage young researchers, Springer Nature offered a total prize of 500 euros for the best posters presented at the 39th ICSC.

Invited speakers (Plenary and Keynote lectures) are invited to contribute to the special issue in the IUPAC journal *Pure and Applied Chemistry*.

We hope that these scientific, cultural, and human connections will strengthen and continue to develop in Rome at the 40th ICSC-2027. Jalel Mhalla is Chair of the 39th ICSC and member of the ISC.

<https://iupac.org/event/39th-international-conference-on-solution-chemistry/>

IUPAC Poster Prize Certificate awarded at the 77th Annual Congress of the Slovak & Czech Chemical Societies

by Milan Drábik, Vicechair of Slovak National Committee of IUPAC

The 77th Annual Congress of the Slovak & Czech Chemical Societies was held from 1-5 September 2025