



## Special Issue on 20th Edition of the International Symposium on Solubility Phenomena and Related Equilibrium Processes

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This special issue comprises selected works presented at the 20th edition of the International Symposium on Solubility Phenomena and Related Equilibrium Processes, held online from 4 to 9 September 2022 at the Polytechnic Institute of Bragança, Portugal. This biennial IUPAC symposium gathered 110 delegates from 25 countries to discuss solubility studies and associated physical properties in various thematic sessions about Ionic Liquids, Computer Assisted Equilibrium Calculation, Deep Eutectic Solvents, Phase Equilibria & Solution Chemistry, Aqueous Solution Chemistry, and Nuclear Waste.

The event was greatly enriched by six invited lectures covering thermodynamic modelling and experimental applications in a wide range of fields: *DES, ES, and ILS: Tailoring Solvents for Sustainable Applications* by Isabel Marrucho (Technical University of Lisbon, Portugal); *Nanostructuring Effect on the Properties of Ionic Fluids* by Luís Belchior Santos (University of Porto, Portugal); *Association-Based Activity Coefficient Models for Nonelectrolyte and Electrolyte Solutions* by Chau-Chyun Chen (Texas Tech University, USA); *Illustrations of the Synergy between Thermodynamics and Chemical Reaction into the Triptych Bioproducts-Bioenergy-Water* by Lucie Coniglio (Lorraine University, France); *Solubility of Biomolecules* by Christoph Held (Dortmund University, Germany); *Pharmaceuticals and Ionic Liquids* by Slobodan Gadzuric (University of Novi Sad, Serbia).

Two additional invited talks (available at <https://iupac.org/project/2022-002-2-500/>) were presented within the project “Workshop on Assessment of Reliability and Uncertainty of Solubility Data”: *Gas Solubility in Materials – A Technical Evaluation of Literature Data* by Johan Jacquemin (Mohammed VI Polytechnic University, Morocco) and *Assessment of Reliability and Uncertainty of Solubility Data* by Ala Bazyleva and Vladimir Diky (National Institute of Standards and Technology, USA).

Finally, the Franzosini Award was granted to Yongheum Jo (Karlsruhe Institute of Technology, Germany; Korea Advanced Institute of Science and Technology & Korea Atomic

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Energy Research Institute, Republic of Korea) in recognition of his achievements as a young researcher in the field of Nuclear Waste, presented in the lecture *Solubility Phenomena and Chemical Equilibrium of Radionuclides in the Systems Relevant for Nuclear Waste Disposal: Uranium/Plutonium(Vi) and Niobium (V)*.

A small but rich glance at the variety of subjects covered in the conference is given by the papers included in this special issue which were collected among the invited lectures, and 48 oral and 34 poster communications.

D. Rabadjieva et al. explored trace metals (Mn, Ni, Cu, Zn, and Pb) dynamics in aqueous soil extracts and phytoaccumulation systems, by conducting both experimental analytical studies and thermodynamic modelling to calculate the metallic chemical species in the extracts. M. Aliyeva et al. studied the effect of chaotropic anions (thiocyanate and tosylate) on the solubility of different amino acids in water, aiming to add to the understanding of the molecular level interactions that take place between ions and biomolecules in aqueous solutions, a hot topic still under debate. Bridging Ionic Liquids and Deep Eutectic Solvents, M. Martins et al. investigated the use of tetraalkylammonium chlorides as melting point depressants of ionic liquids. By measuring the solid–liquid equilibrium phase diagrams of selected binary mixtures and showing the existence of negative deviations from thermodynamic ideality, the formation of new ionic liquid mixtures was demonstrated.

Finally, L. Coniglio presented a comprehensive chemical engineering review paper to highlight the synergy between thermodynamics and chemical reaction in the triptych “bio-products-bioenergy-water”. Two crucial case studies were presented: (i) the solar desalination with power and hydrogen production as well as brine valorization and (ii) the production of bioenergy and bioproducts based on a green circular economy.

As a relevant complement to this special issue, we would like to refer readers to the Conference Book (<http://hdl.handle.net/10198/21439>), where a more detailed vision of the symposium can be experienced.

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