

Foreword: Special issue "Diffusion Fundamentals X"

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*This Foreword opens a Special Issue:
A collection of abstracts of invited lectures*

The Diffusion Fundamentals conference is a well-established biennial event that has been initiated in 2005 - the year of the 150th anniversary of Adolf Fick's and the 100th anniversary of Albert Einstein's fundamental papers on diffusion. This first conference has taken place at Leipzig where these two seminal papers have been published. Continuing a very successful series of conferences in Europe (L'Aquila 2007, Athens 2009, Leipzig 2013, Dresden 2015, Moscow 2017, Erlangen 2019, Krakow 2022) and the Americas (Troy, NY, USA, 2011) the 10th jubilee conference has now been held in September 2023 in Tashkent, Uzbekistan, as its first visit to Asia. After the organization of DF IX was delayed by a year due to the COVID pandemic, the conference series has thus returned to its traditional rhythm of being held in odd-numbered years.

Tashkent, the capital of Uzbekistan, is renowned for its vibrant cityscape and rich cultural heritage as one of the leading trade centers along the Silk Road. Together with the New Uzbekistan University as an upcoming stronghold of science, Tashkent has thus been an ideal host for the 10th Diffusion-Fundamentals jubilee conference.

The Diffusion Fundamentals (DF) conference series is dedicated to spreading phenomena wherever they may occur. Spreading (often, essentially synonymously, referred to as "diffusion") may be observed over microscopic just as over macroscopic dimensions. It may be observed with atoms and molecules as the elementary constituents of our matter, with biological species in our environment and with, finally, us human beings and our material and immaterial "products". As a common feature, it appears in the spreading behavior of the "objects" considered in the various areas. Observation, classification, and comprehension of these phenomena are thus among the main objectives for the scientists in the different disciplines, ranging from social sciences and humanities to engineering and natural sciences. By bringing together scholars from all these disciplines, DF X has once again succeeded in creating an atmosphere, ideally suited to stimulating an exciting exchange of ideas.

Following the conference format as started with DF VIII in Erlangen, 2019, the conference comprised invited talks, poster presentations and workshops. The workshops were scheduled to be performed in the manner of "round table discussions", following one or a couple of introductory talks. Under the title "Diffusion of and in Language" a workshop, jointly shared by Gero Vogl, Vienna, and Uwe Junghanns, Göttingen, dealt with the two-fold occurrence of spreading phenomena in our language, comprising language shifts caused by contacts between different speech communities and the spreading of properties, features and functions of a language within one and the same linguistic system. A second workshop, chaired by Jörg Kärger, Leipzig, was dedicated to "Diffusion in Nanoporous Materials", in continuation of an initiative launched by the IUPAC ("International Union of Pure and Applied Chemistry") on this topic.

The poster session included presentations, by Qu Chen, Hangzhou, on “Molecular Dynamics Simulation on Self-diffusion Coefficients of CO₂ in Substituted Amines”, Joaquim Pérez-Losada, Girona, on “Diffusion of Humans out of Africa and the Phonemic Diversity Cline”, Patricia Seidel, Leipzig, on “Diffusion and Adsorption of 2-methylpentane and 3-methylpentane in Silicalite-1 Crystals” and Nicole Trebel, Marburg, on “Confinement Effects on Distribution and Transport of Neutral Solutes in a Small Hydrophobic Nanopore”. Extended abstracts of these posters may be found in the subsequent volume 38 of the Diffusion Fundamentals Online Journal.

Traditionally, the invited plenary lectures were at the heart of the conference. A particular pleasure for the conference participants was to be able to experience scientists from the host country Uzbekistan, including Boris Goldengorin, Servar Abdullaev and Bobomurat Ahmedov. The present volume 37 provides an overview of all lectures held on the core topic of the conference, i.e. on “Diffusion in Nature, Technology and Society”, with a compilation of the extended abstracts. Together with the contributions written by established representatives of the individual disciplines, it also contains the abstract of Felix Hagemann's presentation, to which he was invited in recognition of his nomination for the Young Researcher Award 2023 of the Saxon Academy of Sciences and Humanities.

The Saxon Academy of Sciences and Humanities has taken over the patronage of the Diffusion-Fundamentals conference series in 2015 during its 6th meeting in Dresden, simultaneously with the edition of a text book with the programmatic title “Diffusive Spreading in Nature, Technology and Society”, emerging from the contributions held during this conference. Fortunately, a greatly expanded new edition of this book (meanwhile honored with the Literature Prize 2019 of the Fund of Chemical Industry) was published prior to the 10th anniversary conference and several authors made it possible to attend. Special mention should be made of Jean-Philippe Platteau, Shlomo Weber and Hans Wiesmeth, whose contribution "The Fight against COVID-19: The Gap between Epidemiologic and Economic Approaches" significantly enriched the new edition with its treatment of a hot current topic (having led to the delay with the previous conference), and Marc-Olivier Coppens, who spoke on the topic of his book chapter "Nature-Inspired Optimization of Transport in Porous Media" not only within the frame of the conference, but also to the students in a well-attended, regular course lecture at New Uzbekistan University. The support of the publisher, Springer Nature, which provided us with several complimentary copies of this book for the conference, is gratefully acknowledged.

In a ceremonial opening event in the large lecture hall of the New Uzbekistan University, which was also well attended by many local visitors, the conference participants were cordially welcomed by Khilola Umarova, Minister of Preschool and School Education of Uzbekistan, and Odil Abdurakhmanov, Advisor to the President of Uzbekistan on Youth, Education, Health, Culture and Sports. Their speeches were followed by Shlomo Weber, conference chair, and Hans Wiesmeth, President of the Saxon Academy of Sciences and Humanities, who included a special welcome to Jörg Kärger and Paul Heitjans in the audience as the “fathers” of the conference series by jointly organizing its first event in 2005 in Leipzig.

In their closing remarks, Yuldashev Bakhtiyor, Vice-rector of the New Uzbekistan University, and Shlomo Weber once again expressed their sincerest thanks to all participants for coming to Tashkent and for contributing to the great success of this conference - followed by the invitation of attending the subsequent DF conference taking place in 2025 at the Northwestern University in Evanston, IL, USA. The hearty applause that followed was especially for also Dinara Datbayeva for her excellent work in dealing with all the administrative challenges that have emerged with the organization of this conference.

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