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Conference Report

SCS Spring Meeting 2018: «Bio-Inspired Chemistry»

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Slightly more than 100 participants from academia and industry attended under a magnificent sun the Spring Meeting 2018 at the University of Neuchâtel on April 6th, 2018. It was the first Spring Meeting in Neuchâtel since 2009. And back then, the topic of the day was 'Nanomaterials by Chemical Design'. This year, the main thread of the day was 'Bio-inspired Chemistry', which was handled from different perspectives by six internationally renowned speakers.

Leroy Cronin

The meeting began with a controversial and provocative talk by ***Leroy Cronin*** from the University of Glasgow; 'Combining Robotics and Artificial Intelligence for Search & Discovery in Chemical Space'. During his presentation, several fundamental questions for chemists were raised, among them: Is there a better place to spend our valuable time than in the laboratory doing manual labor? Can we use artificial intelligence to discover new families of compounds, and new chemical designs, still unknown to chemists? Answers to these questions, and to others, were provided by Professor Cronin, showing how robots can do for us all the manual labors (set up of the experiment, choose the chemicals, perform the purification, isolation, characterization and identification), and why chemists should now focus on the intellectual side of chemistry and identify novelty by analyzing data obtained from artificial intelligence.

Thomas Ward

Thomas Ward, Professor at the University of Basel, was the second speaker of the morning session, taking us in a scientific journey with his lecture entitled 'Artificial Metalloenzymes: Challenges and Opportunities'. We followed his scientific odyssey, from his undergraduate studies, to postdoctoral stays, to his habilitation, and to when he was appointed professor. He shared with us his dreams to develop the ideal catalyst. In his quest, incorporation of organometallic complexes within proteins has successfully created artificial metalloenzymes, with properties reminiscent both of homogeneous and enzymatic catalysis. The optimization of these hybrid catalytic systems combines random mutagenesis of the protein with chemical variation of the metal complexes, showing how this strategy has generated highly efficient catalysts for selected reactions, and why it remains an active field of research.

Then, just before lunch, the laureate of the Werner Prize 2018, ***Sandra Luber***, University of Zurich, presented her research on: 'Advanced Computational Approaches for Bio-Inspired Water Splitting'. For decades, the challenge of water splitting has been pursued by research groups around the world. Despite significant progress, economical processes to produce hydrogen from water continue to elude us. Solar light-driven water splitting shows great promise, and since water oxidation remains the limiting step for the development of high-performance artificial water splitting devices, Professor Luber and her group have looked at systems used in nature. With the help of computational methods, they have been able to identify key aspects in these photo-catalytic processes and to suggest new avenues to explore.

Sandra Luber

Jean-Pierre Sauvage

Winner of the 2016 Nobel Prize in chemistry, ***Jean-Pierre Sauvage***, University of Strasbourg, was the first speaker after the lunch. The title of his talk was 'From Chemical Topology to Molecular Machines'. Professor Sauvage gave us a historical background on how the first catenane was designed and prepared in his laboratory. He reminded us that without gifted collaborators new discoveries are difficult to make, giving credit to Christiane Dietrich-Buchecker, who played a major role in this adventure. These two interlocking ring-shaped molecules that are found in catenanes have paved the way to much complicated molecular systems, a field that is called chemical topology. He also presented the pioneered work of the other two recipients of the 2016 Nobel Prize, Bernard L. Feringa and Sir J. Fraser Stoddart. These exceptional chemists were involved in the conception of molecular rotors and rotaxanes. He closed his presentation by sharing with us photos of the banquet in Stockholm, the award ceremony, and himself with the Royal Family of Sweden.

Takashi Kato

Takashi Kato, from the University of Tokyo, had the difficult task to talk immediately after Professor Sauvage. He presented his latest results in 'Supramolecular Assemblies and Nanostructured Liquid Crystals for Future Materials'. Liquid crystals are already among us, and have become essential to modern technologies. The upcoming generation of soft molecular materials which exhibit dynamic functions, environmental benignity, and self-organized structures were described by Professor Kato. Among these future molecular systems, he showed for example that mechanical forces can be used to modify the optical response of luminescent molecular assemblies, thus fabricating on/off photoluminescent switches that offer new perspectives in the development of smart materials.

After a coffee break, the last presentation of the day was delivered by Professor ***Peng Yin*** from the Wyss Institute, Harvard University. The title of the presentation was 'Molecular Programming with DNA/RNA'. During this lecture, fascinating examples on how DNA bricks can be used to build nanostructures

Peng Yin

with custom-made geometry were presented. Just like a 3D printer, we could see objects being formed instantly in front of our eyes. Insertion of functional entities to these nanostructures can also generate molecular systems for diverse applications, such as in bioimaging, sensing, diagnostics, and therapeutics. Professor Yin and his colleagues are scientists combining chemistry, biology, physics and engineering. Together, they are developing nanoscale structures inspired by biology.

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Impressions of the Spring Meeting in Neuchatel