



## The Young Faculty Meeting 2020 – Beyond Research: Components to Success

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The «Platform Chemistry» of the Swiss Academy of Sciences (SCNAT) organized on February 12<sup>th</sup> 2020 in Bern the 13<sup>th</sup> edition of the Young Faculty Meeting, inviting young professors and group leaders in chemistry in the first 10 years of their independent career to share their views about chemistry in and beyond academic laboratories. This year's YFM was organized by the authors and supported by the Swiss Academy of Science. The day was devoted to a mix of scientific talks and presentations related to the transfer of chemical knowledge outside research laboratories, towards industry and general public.



Ilija Čorić

Maartje Bastings

The morning session was expertly started by *Ilija Čorić*, group leader at UZH, who took us for a trip into the world of rationally designed C–H activation processes. At the heart of his research stands the optimization of ligand spheres to facilitate concerted, palladium-mediated deprotonation reactions. He demonstrated how he and his team use aromatic frameworks to carefully place carboxylate ions in the proximity of the catalytically active palladium center. This placement controls the coordination geometry of the anion and with it the mode of activity of the catalyst. Ilija showed beautiful crystal structures supporting his approach and outlined the first forays into deploying his structures as C–H catalysts.

*Maartje Bastings*, Assistant Professor at EPFL, then took the organization of matter from atoms to the macromolecular scale. In her talk, she showed the versatility of DNA as precision material owing to its monodispersity of 1, recognition sites and a highly defined three-dimensionality. Maartje showed how they can program binding affinities of hybrid, multivalent DNA-nanomaterials to discriminate between cancerous and healthy cells. Because cancerous cells display a higher density of proteins

on their surface, the (tagged) nanomaterial binds super-selectively to these surfaces, while with a lower density, the binding of the material becomes a weak, single-site event. She then went on to show how these nano-precise materials can be used intracellularly for geometry-based immune signalling.

From the University of Basel, Ambizione Fellow *Tomáš Šolomek* presented his foray into redox-active organic cages. Inspired by fullerenes, which are great electron acceptors as a result of their three-dimensional structure, he and his team are designing organic cages as fullerene mimics. These cages feature extensive  $\pi$ -systems that are spatially arranged such that electron transfer can occur rapidly without reorganization penalties. Contrary to fullerenes, these systems can easily be modified in their dimensionality by changing core-units, linker-lengths and -type, and are porous. The assembly from a building block to a cage is driven by dynamic covalent chemistry, which enables self-correction and chiral self-sorting. By EPR, Tomáš and his team have found charge/electron transfer processes occurring inside their cages that they are currently developing as bulk materials.



Tomáš Šolomek

Fernando Gomollón-Bel

The morning session was finished up with an insightful talk by *Fernando Gomollón-Bel*, the press and communication coordinator of EU Graphene Flagship. He took us into the world of the “science beyond the paper” (<https://cen.acs.org/acs-news/comment/stop-calling-nontraditional-careers/96/i32>). He insisted quite rightfully, that leaving academia is *not* a failure, but a valid strategy for young scientists that PIs should help prepare their students for. The non-academic career path is often seen as a (weak) alternative but Fernando made it expertly clear that this is not the case. To complete a PhD takes many skills that are highly sought after by employers beyond academia. Amongst these, Fernando listed resilience, work ethics and motivation. He then went on to challenge our view of the scientific output we generate and urged scientists to not forget outreach as part of the publishing process. He showed strategies on how to get the hard-earned research success “out there” and tailor to the respective communities by carefully considering language, content and medium. Outreach is a way to bridge the gap young academics often face when completing their training. With a slightly ironic undertone he concluded that it is never too late to join the “dark side”.

Lunch break and coffee breaks throughout the day allowed all attendees to continue discussions, share their experiences and network.

The afternoon session was kicked off by **Jeremy Luterbacher**, associate Professor at EPFL, who introduced his view towards the “building of a research and tech-transfer program as a young faculty”. He illustrated his talk with real-world situation he has faced over the creation of two startups from his research group: Treatech, targeting the valorization of sewage sludge as sustainable sources of methane and phosphoric acid, and Bloom Biorenewables providing sustainable value-added aromatic syntheses from lignocellulosic materials. Building on these examples, he highlighted the key steps to transfer an idea from the lab to the market, from patenting to creating a company and identifying potential consumers. He stressed in particular the importance of identifying the right coworkers with an entrepreneurial mindset to start the company, and gave insights on the important points to follow to be able to allow the startup to survive up to the first large investment. The importance of the local environment and of funding opportunities, notably *via* the BRIDGE program from the SNF or the Gebert R uf Stiftung were discussed.



Cristian Pezzato

Jeremy Luterbacher

This excursion out of the academic lab was followed by a talk from **Cristian Pezzato**, SNSF Ambizione Fellow at EPFL, who presented his latest results in his talk on “the dark side of metastable-state photoacids”. After a general presentation of photoacids, that are chemical species able to release protons upon light exposure, he highlighted the lack of a thermodynamic rationale for describing the pH changes induced by metastable-state photoacids. To address this, he introduced new strategies to probe photoacidity using proton NMR and UV-Vis titrations and exemplified their use on a series of new compounds.

In her talk ‘Engineering artificial metalloenzymes based on *de novo* metal-protein complexes’, **Cathleen Zeymer**, SNSF Ambizione Fellow at ETHZ, dove into the preparation of artificial enzymes. She utilizes computationally designed protein scaffolds and a dative anchoring strategy for metal incorporation – *i.e.* engineering the protein to have the desired ligand properties and allowing for the direct coordination of the metal cofactor in the protein. She presented her use of *de novo* TIM barrels as a modular platform for metal binding, providing a ligand scaffold to generate di-Rh and lanthanide-binding proteins as potential catalysts.

The last talk of the afternoon was given by **Javier Garc a-Mart nez**, professor at the University of Alicante but also co-founder of Rive Technology and IUPAC president-elect. He presented his views on “the new chemist” (<https://cen.acs.org/articles/96/i6/new-chemist.html>) and how chemical industry and the work as chemists will be transformed by the current change of the industrial market, stressing the importance of chemical education. He stressed that, considering the current and future implications of artificial intelligence, chemistry teaching will have to incorporate these concepts, and be able to better connect concepts with real-life examples to contextualize content and concepts. Javier encouraged the audience not to forget the big



Cathleen Zeymer

Javier Garc a-Mart nez

achievements of chemistry in the past for society and mankind, taking water treatment and the Haber-Bosch process as examples, and to better highlight to general public the future possible contributions of chemistry to solve key global challenges. He highlighted the role of chemical societies and IUPAC to bridge the chemical world with future technological applications. As a conclusion, he stressed the role of young faculty as role models to inspire the next generation of chemists and prepare them to the future challenges of chemical industry.



The interactive panel discussion concluded the day. The session was ended by an ap ero and panel discussion with Javier Garc a-Mart nez, Fernando Gomoll n-Bel and Jeremy Luterbacher where all participants had the chance to exchange on the topics developed throughout the day, beyond academic research.



The panel was moderated by **Victor Mougel** and **Michel Rickhaus**.

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