

NaWuReTs-YounGeCatS Summer School 2022 – Report

Today the three biggest challenges of the chemical society are the chemical energy storage, sustainable chemistry and digitalization. Those were tackled during the recent summer school “Shaping a green future by reaction engineering and catalysis” in the beautiful city of Ulm. It was organized by the NaWuReTs and YounGeCatS and took place from the 23rd till 25th May. In total 25 participants from different German and international research institutes broadened their field during talks held by invited speakers from academia and industry, but also during workshops and group work-sessions.

Prof. Maximilian Fichtner (Helmholz-Institut Ulm) opened the event with a talk on the future of propulsion focusing on advances in battery technologies. He further highlighted the importance of numbers, when comparing different energy storing technologies e.g. H₂, e-Fuels or batteries, as in the ongoing debate about the most viable technology these are often left out.

During the workshop on “Science in the digital age” Dr. Kathrin Reinke (Dr. Schmeink Consulting) brought up the importance of digitalization and gave new insights as well as provided guidelines on utilization of social media in professional context. The main take-away messages here were: be a real person, but also a valuable part of your own network.

Dr. Thomas Seidensticker (TU Dortmund) gave a talk on recycling of homogeneous catalysts. He reported on mixing technologies of reactants with catalysts present in different liquid phases, but also separation of homogeneous catalysts by utilization of membranes. Further he shared insight into advances in upscaling homogeneous catalysis reaction from laboratory to miniplant scale. All in all he showed how engineers and chemists work together in this field – matching the overall purpose of the summer school perfectly.

The first day was closed by a Poster Party, where the participants shared their research work, while networking and connecting not only in real life but also in the digital space.

In the following morning Prof. Christian Hasse (TU Darmstadt, SFB/TRR150) introduced the participants to his research on flame-wall and fluid-wall interactions, which plays an important role in chemical and mechanical process engineering.

Further he shared a view on interesting alternative chemical energy storage technologies - among others he presented iron as a sustainable energy carrier.

Dr. Ivana Jevtoviki shared insights on organization and capabilities of an early phase laboratory facilities of High Throughput Experimentation (BASF/hte), where materials are tested for catalytic applications. On this regard, the participants discussed about motivations for digitalization in industry and academia. The final thought of the talk and discussion was: smart data is better than big data.

The last talk of the day was given by Dr. Anna Pougina (Evonik Industries/Creavis), who spoke about hydrogen as energy storage medium, as well as the challenges which occur not only during the energy conversion, but also the following steps such as transportation and distribution. Among others she reported on high performance materials created for the Hydrogen Infrastructure and how Creavis tackles the circular economy and recycling aspects of the materials. She motivated the participants to always consider not only the footprint of their work, but also the handprint.

Traditionally gathered for a dinner in the cozy restaurant "Drei Kannen", where the participant enjoyed different dishes and beverages from southern German kitchen.

On the last day Dr. Michael Liebau (Universität Leipzig, NFDI4Cat) introduced the participants to the digitalization project NFDI4Cat, which is part of the national research data infrastructure. In an interactive workshop he showed what research data management in the field of catalysis and reaction engineering might look like. He increased the awareness of the participant towards proper data management, which saves a lot of time and work later. Additionally, he encouraged apply digitalization not only to research results but also to meta data of the experiments.

In-between the talks the participants worked in groups of five on the task of "How science does contribute to the society in 30 years?". As the closing event of the summer school all groups had to present their results in short 10 min presentation, subsequently selecting the best one by voting. Most groups had similar approaches; however, the winning team rephrased the main task giving their presentation the title "Let's make science sexy again!". Among tackling the climate crisis and resource sufficiency in industry, social coherence was pointed out as most important topic. By combining communication, cooperation, and digitalization they proposed the VISION.2050: here science exists without any frontiers and is moreover situated in the

middle of the whole society, which more than ever relies on value cycles in place of chains.