



Members' Newsletter

“Transition towards green”

The year 2022 is ending and there has been several activities during the year.

The most important event was the 19th Nordic Symposium on Catalysis, held on June 6-8 in Espoo. We did finally arrange this event after couple of years delay due to Covid-19, having over 170 participants from Nordic countries and other parts of Europe. We were also very happy to get renown plenary speakers, professors Bert Weckhuysen, Gabriele Centi, and Sara Blomberg, to present the challenges of mankind and how to tackle them in means of catalysis. It was easy to find out that researchers have waited possibilities to join again conferences, seminars and other activities where they can meet others and discuss together really on-site, not only on-line.

Another very successful event held in 2022 was the 6th Finnish Young Scientists Forum on Catalysis, Turku/Åbo, April 8 together with the Finnish Catalysis Society Annual Meeting. In the event, there were three keynote lectures and around 25 oral and poster presentations. In the event the Best doctoral thesis in catalysis 2019-2021 award was announced.

Please, read more about the 19th NSC, FYSFC and the Award in this Newsletter stories.

In general, during the last years the transition towards green and clean fuels has been at glance, as lot of wind and solar energy has been installed and thus, green electricity is more available for e.g., hydrogen production. However, questions how to store surplus electricity e.g., in batteries, or convert it to fuels and chemicals is still a big challenge. There is lot of on-going activities to develop new photovoltaic panels, batteries, and photocatalysts, as well as Power-to-X technologies. Catalysis is at core in all these, so research and innovations are needed.

Waiting that in the coming years there will be many Doctoral and Master's theses and studies which will help to find solutions for the present challenges and foster the transition towards fossil-free world.

Wishing Prosperous Year 2023

Mika Huuhtanen

Chairman



19th Nordic Symposium on Catalysis

19th Nordic Symposium on Catalysis (19th NSC) organized by Finnish Catalysis Society was held in Espoo 6 – 8th June 2022. Nordic Symposia are a series of conferences started in 1988 in Lund. This was the fifth time the conference was organized in Finland and second time in Finnish capitol area. Last time the conference was held in Espoo in 1990. The basic idea of Nordic Symposia is that conference will be organized in every Nordic Country being active in Nordic Catalysis Society (Denmark, Finland, Norway, Sweden) every 8th year. However, this time the conference organized in Finland was postponed by two years due to COVID-19.

The venue of this year conference was Dipoli in Otaniemi. Dipoli is a current main building of Aalto University originally designed by famous architects Reima and Raili Pietilä for student union building of Helsinki University of Technology. Dipoli is a versatile building for various events and served well as a venue of 19th NSC.

The number of the participants in the conference was 171 exceeding the targets set by the organizing committee. In addition to official participants, there were almost 15 volunteers from Aalto University and VTT in the conference helping with the practical arrangements. Altogether 3 plenary, 3 Nordic keynote, 66 oral presentations were given and in addition to these 56 posters were presented. Oral presentations were organized to three parallel sessions. Two excellent plenary talks were given by Gabriele Centi and Bert Weckhuysen both handling how to solve great challenges of mankind (climate change, plastic waste etc.) with the help of catalysts. In addition to these two invited plenary speakers, third plenary presentation was given by Sara

Blomberg, winner of this year Berzelius catalysis price. The winner was published at the conference.

The opening words of the conference were given by President and CEO of VTT Technical Research Centre of Finland Antti Vasara. In his speech, Antti Vasara also emphasized the role of science as well catalysis in solving the challenges of mankind. In addition to scientific program, opening reception hosted by city of Espoo and conference dinner were organized. The conference dinner was held in restaurant NJK on beautiful island of Valkosaari just outside Helsinki South Harbour. Even the weather was on our side enabling an enjoyable evening. Dinner speech was given by Lars Peter Lindfors, Senior Vice President Innovation of conference gold sponsor Neste. Lars Peter reviewed his own career as catalysis researcher and as well addressed the importance of catalysis solving challenges in climate change mitigation. In addition to Neste, 8 other companies and organizations supported our event exceeding the targets set by the organizing committee. The exhibition of the conference was a success as well with 11 exhibitors with a booth.

19th NSC was very international event with excellent representation from all four Nordic Countries being active in the field of catalysis. In addition to those, there were 30 European participants outside Nordic countries and even 6 participants outside EU.

When the organizing committee started the work in 2018, a two-year project was expected. The first dates of the conference were set to be 24 – 26th August, 2020. Even abstracts were already collected for 2020 event before we were forced to postpone the conference due to COVID-19 situation. Finally, we got a four-year project, however, it

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was a wise decision to postpone the event to 2022 instead of 2021. However, corona caused grey hairs to the organizing committee almost until the last moment. During spring 2022, we made many considerations between on-site, remote and hybrid event. Finally, we ended up to an on-site conference with light hybrid option for those presenters who could not enter the conference. Now, it can be concluded that this was a good choice. Only three oral presentations were cancelled, and only one presentation was held successfully applying Zoom.

In general, it seemed to be a high need for the researchers to meet each other again and this reflected as very positive and discussing atmosphere at 19th NSC. As a conclusion, it can be stated to that 19th NSC succeeded scientifically, economically and in connecting people. For reaching this, I would like to thank all other members of organizing committee Riikka, Matti, Eveliina, Elina, Henrik, Mika and Outi and all the volunteers at the conference. Furthermore, I would like to thank all the sponsors and exhibitors who supported the conference as well as the members of scientific committee who enabled our scientific program.

Juha Lehtonen
Research professor
19th NSC, chairman of the organizing committee

Sixth Finnish Young Scientist Forum on Catalysis took place in Turku/Åbo

After one year of postponement, and the following kept online, the Sixth Young Scientist Forum in Catalysis (YSF) took place as a real face-to-face meeting on the 8th of

April 2022, this year in the former prison facilities on the Kakola hill in Turku/Åbo. The meeting started with breakfast and roundwalk in the brand new campus building Aurum, where the local organizers of Åbo Akademi had moved to during autumn 2021.

After the laboratory tour, the scientific programme was continued in the Chapel of the former Kakola prison. The programme was opened by Academy Professor Tapio Salmi and followed by a sentimental music performance by the choir Brahe Djäkna, who sang the national anthems of Finland and Ukraine.



The local choir Brahe Djäkna performing national Anthems



Attendees waiting between lectures

The scientific programme consisted of three keynote lectures, ten oral presentations, one award lecture and 16 poster contributions. The talks ranged over many branches of catalysis, such as heterogeneous, homogeneous, enzymatic, photocatalytic and electrocatalytic

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research. This year, YSF was delighted to attract not only participants from Finland, but also participants from Royal Institute of Technology in Stockholm (KTH) as well as Umeå University. Overall, the event had approximately 75 participants. Keynote lectures of this year were presented by Juha Siitonen (Aalto University) who gave “An overview of unconventional organocatalysts in synthesis”, Efthymios Kantarelis (KTH) who presented “The role of catalysis in defossilizing industrial and society – a Swedish perspective”, and Pasi Virtanen (Åbo Akademi) with the talk “Supported ionic liquid catalysts (SILCA) – From first ideas to present innovations”. The local organizers were additionally very happy that the Vice rector elect of Åbo Akademi, professor Reko Leino honoured the seminar with his presence.



The keynote lecturers Juha Siitonen, Efthymios Kantarelis and Pasi Virtanen on the scene

Before the Poster session, the best thesis in Finnish Catalysis for years 2019-2021 was announced, following the award ceremony and the award winner’s lecture. The award winner was Dr Soudabeh Saeid from Åbo Akademi. The awardee and the thesis is presented in another headline of today’s KATSE newsletter (scroll down). During the poster session, one could also enjoy selected photos from the local organizers’ Photo Exhibition Primavera, which had been arranged earlier this spring. Around 70 pictures of high level were contributed and were now on display.

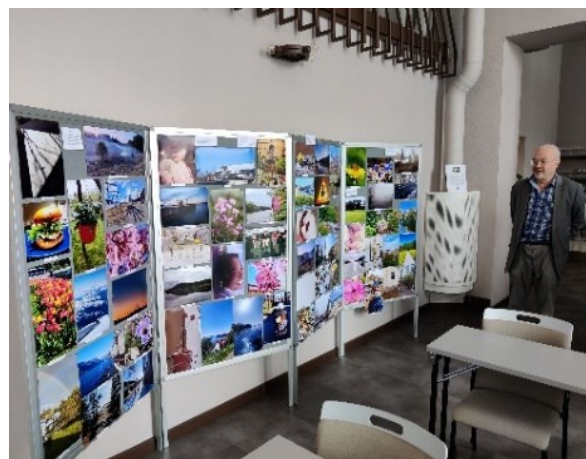
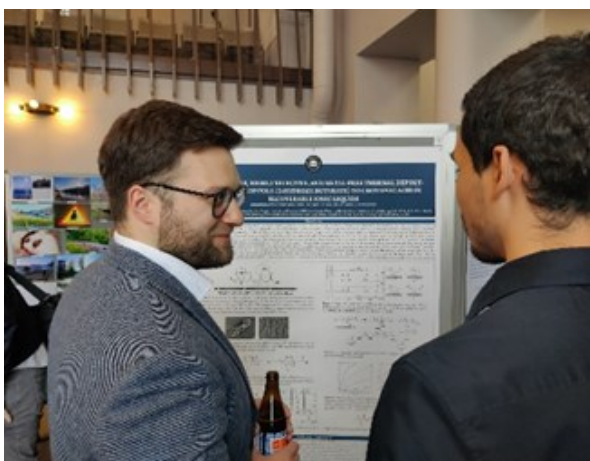
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Lively discussions at the poster session and the photo exhibition Primavera:



After the scientific presentations, some guests were eager to enjoy either Escape Room or a guided roundwalk on Kakola hill and prison.



Finally, participants were able to network over a dinner in a relaxed manner at the shore of Aura River, in the restaurant Rantakerttu's downstairs pub called Hunsvotti. The reserved sauna gained also a lot of attraction.

A short movie of the YSF as it happened is available privately on Youtube and can be found with the following link only: <https://youtu.be/1LBCZxLrMhc>

A collection of photos are available at <https://photos.app.goo.gl/JKs7aa7jPhjV1NxX6>

We hope that all participants enjoyed meeting again physically after a two-year break caused by the pandemia. We hope to meet you next year again at YSF!

With warm summer greetings,
Pasi Tolvanen & Tapio Salmi
All Pictures by Pasi Tolvanen

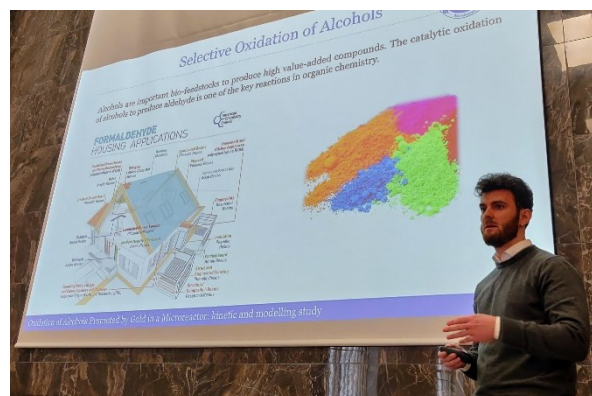
YSF 2023 – University of Eastern Finland

The event planning is ongoing and detailed information will be available early 2023. The preliminary schedule for the event is Friday 31.3.2023 at UEF Joensuu Campus.

Italian Chemical Society Award to Luca Mastroianni

M.Sc. has obtained the award of Italian Chemical Society for his master's thesis (diplomarbete) devoted to the use of microreactor technology for selective oxidation of alcohols. The work was done at the Laboratory of Industrial Chemistry and

Reaction Engineering (TKR) at Åbo Akademi (ÅA) in collaboration with Università di Napoli 'Federico II' (UniNa). Preparation of aldehydes, i.e. formaldehyde, acetaldehyde as well as propyl- and butyraldehyde are important processes for chemical industry, because aldehydes can be refined further to valuable products such as polyols. Mastroianni showed in his research that it is possible to produce aldehydes via selective oxidation of alcohols on gold catalysts, which are placed in microreactor channels. The work comprised an extensive experimental campaign and an advanced mathematical modelling effort. The work combines fundamental chemistry and today's high technology in reactor design. The thesis project was supervised by Tapio Salmi, Dmitry Murzin, Kari Eränen, Martino Di Serio and Vincenzo Russo. It has already been published at a very prestigious forum of chemical engineering, in the journal Chemical Engineering Science (Mastroianni et al., Microreactor technology in experimental and modelling study of alcohol oxidation on nanogold). Our fruitful and extensive collaboration with the university in Naples continues in high speed, Luca has commenced with his doctoral thesis which will result in a double degree (cotutelle) at ÅA and UniNa, academy professor Tapio Salmi states.





Best doctoral thesis award 2019-2021 to Dr Soudabeh Saeid

The prestigious award for best doctoral thesis in catalysis in Finland was given to doctor Soudabeh Saeid from Åbo Akademi. The prize is given every third year and covers all fields of catalysis, i.e. homogeneous, heterogeneous, enzymatic and polymer catalysis. In total 6 proposals were submitted to Finnish Catalysis Society, out of which three theses were sent to final evaluation. The final evaluator, Professor Salvador Ordóñez from the university of Oviedo, Spain decided that the thesis award for years 2019-2021 should go to Soudabeh.

The doctoral thesis of Soudabeh Saeid entitled 'Destruction of selected pharmaceuticals by ozonation and heterogeneous catalysis' is a monumental pioneering work with a great scientific, technological and societal impact. The thesis consists a summary and eight journal articles published in good and excellent journals. The work is also a marvelous example of the collaboration of two laboratories at Åbo Akademi: Industrial chemistry & reaction engineering (Teknisk kemi och reaktionsteknik, TKR) and Organic chemistry. The work has been presented in twelve international conferences. The happy prize winner gave an excellent award lecture at Young Scientific Forum in Turku/Åbo on 8th of June and enjoyed the scientific and social programme of the event.

The brief summary of the content and impact of the work is given below.

The availability and quality of clean and safe water supplies is directly connected to the modality of wastewater treatment. Municipal wastewater treatment processes are designed to purify and degrade polluting components

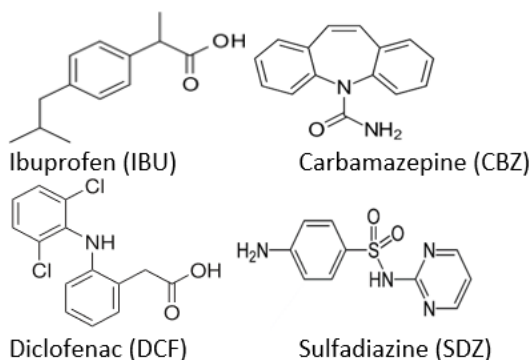
from water, most of these technologies are not capable to eliminate organic micro-pollutants entirely but might even increase the toxicity of the treated water compared to untreated water by transforming these contaminants to more toxic components. Among these harmful organic pollutants, the increasing appearance of pharmaceuticals in surface waters has attracted a significant concern due to their non-biodegradability, chemical resistance, and toxicity impact on the aquatic life. These contaminants and the by-products of their degradation continuously discharge to surface waters and maintain their chemical structures, and therapeutic efficiency for a long period of time, which has a very negative impact on the aquatic environment, especially the aquatic fauna.

The degradation of four frequently detected pharmaceutical molecules in the Baltic Sea region, ibuprofen (IBU), carbamazepine (CBZ), diclofenac (DCF) and sulfadiazine (SDZ) by catalytic and non-catalytic ozonation was studied in the doctoral theses. The purpose of the research was to synthesize active and durable heterogeneous catalysts which combined with an ozonation process could eliminate these contaminants without toxic by-products and intermediates. The goal is the total and quantitative oxidation of the pharmaceuticals to carbon dioxide and water. The target molecules to be destroyed with the new technology are displayed below.

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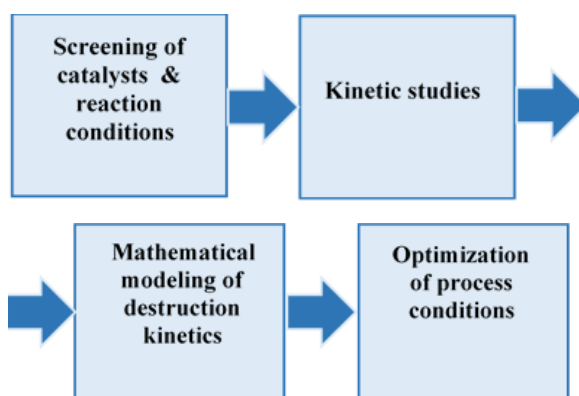
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Pharmaceutical compounds investigated in the thesis of Dr Soudabeh Saeid

The research strategy is summarized below.



Research strategy in the doctoral thesis of Dr Soudabeh Saeid

The great novelty of the thesis is the combination of two technologies, ozonation and heterogeneous catalysis in order to remove the pharmaceuticals from waste waters in such a way that the drug molecules are completely eliminated and the slip of harmful, partially oxidized intermediates is eliminated thanks to the involvement of heterogeneous catalysis. The thesis work bridges fundamental research in chemistry and the most modern process technology. Thanks to the very advanced chemical analysis based on chromatography and nuclear magnetic resonance spectroscopy (NMR) it was possible to identify the harmful

intermediates and to take measures for their elimination. The exceptionally extensive screening of heterogeneous catalysts gave excellent guidelines for the combination of the ozonation-catalytic technology. The very fundamental reaction kinetic studies, i.e. the studies of the ozonation rates and product distributions are of global importance and they are great news to the scientific community within the Baltic Sea region and on all the continents on the Earth.



PhD Award ceremony. From left Mika Huuhtanen, Eveliina Mäkelä and awardee Soudabeh Saeid. Photo: Riikka Puurunen.

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Conferences and Symposia

EuropaCat2023, 27 August – 1 September
<https://www.europacat2023.cz/>

See also e.g.

www.conference-service.com

www.iacs-catalysis.org

Web pages

<http://www.katalyysiseura.org>

<http://www.kemianseura.fi>

<http://www.efcats.org>



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The Board of the Finnish Catalysis Society wish to get feedback about the Katse newsletter from the members of the society.

In addition, please send news and information of activities e.g. doctoral dissertations, national and international events, prizes, and courses to be published in the Katse. The feedback and news can be sent to the Board members.

Thank you.